APPENDIX A

BACKGROUND SCIENCE METHODOLOGY

APPENDIX A

BACKGROUND SCIENCE AND REGULATORY METHODS

This Appendix provides background information on streams and natural channel design techniques; methodologies used to evaluate impact and mitigation channels; and an analysis of regulations that apply to the mitigation approach proposed for this project.

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1.0 DEFINITIONS AND JURISDICTIONAL STATUS OF HEADWATER STREAM

Headwater streams are generally considered to be first or second order streams, where the concept of stream order has been defined by Horton (1945). First order streams are considered to be those without tributaries. A second order stream has at least two upstream tributaries. Headwater streams may be classified more specifically as ephemeral, intermittent, or perennial stream channels. The Federal Surface Mining Control and Reclamation Act of 1977 (SMCRA) defines an ephemeral stream as "… a stream which flows only in direct response to precipitation in the immediate watershed or in response to the melting of a cover of snow and ice, and which has a channel bottom that is always above the local water table." An intermittent stream is defined as "… a stream that is below the local water table for at least some part of the year, and obtains its flow from both surface runoff and groundwater discharge." Perennial streams are those streams which generally have flow throughout the year, whose streambed is nearly always below the local water table, and support aquatic life whose life history requires residence in flowing waters for a continuous period of at least six months.

To provide a basis for field evaluations of ephemeral and intermittent stream identification, the West Virginia Department of Environmental Protection (WVDEP) developed *Guidance for Delineation of Ephemeral/Intermittent Streams* in October 1999. This procedure was used to delineate jurisdictional stream reaches for this project. The methods utilized for the field delineations which were conducted jointly by the permit applicant and WVDEP personnel are summarized below:

- Delineate the upper most extent of the ordinary high water for each steam channel within the footprint (area of impact). Locate this point on a map and provide sufficient supporting documentation. This point is the upstream terminus of the ephemeral channel reach.
- Begin walking downstream, until pooled or flowing water is observed in channel within the footprint. Locate this point on a map and provide sufficient supporting documentation.
- Excavate (preferably 12 inches or deeper) in the streambed outside the area of the pool to determine if the water is entering the hole - this should be apparent within a few minutes. If not, repeat process downstream until the local water table is established or outside the buffer zone area. This point will be the downstream terminus of the ephemeral channel reach, and the upstream terminus of the intermittent channel reach. If no consensus can be reached between the applicant and agency, proceed to the next step.
- A biological survey using the "single habitat" U.S. Environmental Protection Agency Rapid Bioassessment Protocol must be conducted for the stream reach in question. If the reach is void of indications of aquatic life, then the area is deemed to be an ephemeral reach of the stream. However, if there is evidence of aquatic life present in the stream that requires less than six months of water flow to complete its life cycle, then the section of stream is deemed to be intermittent.

The US Army Corps of Engineers (USACE) has jurisdiction over the permitting of discharge and fill material into "waters of the United States" under Section 404 of the Clean Water Act. Within West Virginia, Section 401 of the Clean Water Act, which addresses potential violation to state water quality standards and designated uses of streams, is enforced by the state Department of Environmental Protection (WVDEP). Information in this report is being provided to describe how mitigation activities, as described herein, will offset proposed impacts to waters under the jurisdiction of the USACE and WVDEP.

2.0 MITIGATION METHODOLOGY FOR HEADWATER STREAMS

On December 24, 2002, the USACE issued a Regulatory Guidance Letter (RGL 02-2), which defines stream mitigation replacement requirements. This guidance states that, "where functional assessment is not practical, mitigation projects for streams should generally replace linear feet of stream on a one-to-one basis." CONSOL has complied with RGL 02-2, and will provide more than a 1:1 linear foot replacement by restoring streams on-site and by creating channels on-site.

On July 16, 2007, the USACE released an interim assessment approach for addressing stream impacts and mitigation plans for high gradient streams (channel slope greater than four percent) in West Virginia. The document was designed to aid the USACE offices in the Clean Water Act Section 404 permitting process for high gradient streams. USACE also developed a mechanistic approach to assessing high and low gradient stream function and this method has been used in Virginia. These two methods are detailed in Section 2.2 and Section 2.32.3 below..

On April 10, 2008, the USACE and USEPA issued regulations (33 CFR Part 332 and 40 CFR Part 230, respectively) governing compensatory mitigation for activities authorized by permits issued by the USACE, entitled "Compensatory Mitigation for Losses of Aquatic Resources; Final Rule," commonly referred to as the Mitigation Rule. In their summary to the Mitigation Rule, the USACE and USEPA state that (emphasis added),

> "The regulations establish performance standards and criteria for the use of permittee-responsible compensatory mitigation, mitigation banks, and in-lieu programs to improve the quality and success of compensatory mitigation projects for activities authorized by Department of the Army permits.
>
> "This rule improves the planning, implementation and management of compensatory mitigation projects by ***emphasizing a watershed approach*** in selecting compensatory mitigation project locations, requiring measurable, enforceable ecological performance standards and regular monitoring for all types of compensation and specifying the components of a complete compensatory mitigation plan, including assurances of long-term protection of compensation sites, financial assurances, and identification of the parties responsible for specific project tasks"

USACE and USEPA have preserved the mitigation sequence to avoid, minimize, and compensate for unavoidable impacts and lost aquatic functions. In addition, they have established a preference hierarchy for mechanisms of compensatory mitigation, as follows:

1) Mitigation banks
2) In-lieu fee programs
3) Permittee-responsible mitigation using a watershed approach
4) On-site and/or in-kind permittee-responsible mitigation
5) Off-site and/or out-of-kind permittee-responsible mitigation

The Mitigation Rule outlines requirements for each of these compensatory mitigation mechanisms and also provides time frames for Federal review.

2.1 Practicable Alternative Analysis for Mitigation

This section identifies the selection process in choosing from the hierarchy for mitigation options discussed in the Mitigation Rule. The goal of the selection process was to identify the most feasible and practicable mitigation option for the Buffalo Mountain Surface Mine project.

2.1.1 Mitigation Banks

According to the Huntington District of the USACE, the use of a mitigation bank shall be within the same 8-digit Hydrological Unit Code (HUC) as the proposed impact. For the Buffalo Mountain Surface Mine project, the mitigation would need to be located in the Tug Fork watershed (HUC 05070201). At the time this plan was submitted to the USACE, a mitigation bank was not available in the Tug Fork watershed; therefore, this option is not feasible for this project.

2.1.2 In-Lieu Fee Program

According to the "In-Lieu Fee Mitigation Fees Agreement" between the WVDEP and the USACE (USACE & WVDEP, 2006), payment of fees to the WVDEP is recognized as an approved in-lieu fee program. The agreement states that after permittees demonstrate that project impacts cannot be avoided, further minimized, nor mitigated on- or off-site, the permittee may achieve mitigation by paying into the in-lieu fee program. CONSOL has demonstrated that mitigation can effectively be applied both on- and off-site of the proposed permit area; therefore, the in-lieu fee program will not be utilized for this project.

2.1.3 Permittee-Responsible using Watershed Approach

In the absence of a mitigation bank in the service area of the proposed Buffalo Mountain Surface Mine permit area and the demonstrated ability to conduct on-and off-site mitigation in lieu of the utilizing the in-lieu fee program, As detailed in this Mitigation Plan, CONSOL has demonstrated that project impacts can be mitigated on- and off-site; therefore, in accordance with the USACE and WVDEP agreement detailed above (Section 2.1.2), CONSOL is not required to use the In-Lieu Fee option and has chosen the Permittee-Responsible mitigation option using the Watershed Approach as their most practicable alternative. By applying a watershed-based approach, CONSOL will incorporate on- and off-site mitigation, both in-kind and out-of-kind, within the Miller Creek, and Pigeon Creek watersheds to satisfy regulatory requirements. Using functional and structural measurements, CONSOL will provide a no net loss of stream length, function, and structure by implementing stream mitigation for the unavoidable losses to aquatic resources. The following sections (Sections 2.2 and 2.3) detail two protocols used to help ensure no net loss of function.

2.2 West Virginia's Interim Functional Assessment Approach (IFAA)

2.2.1 Stream Function

The Interim Functional Assessment Approach (IFAA), developed by the USACE Engineering Research and Development Center (ERDC) in June 2007, involves a visual evaluation of the physical and biological structure of a high gradient (greater than four percent) stream. The evaluation is then used to rate the site's stressors based on a combined overall functional capacity index (FCI), which is separated into four categories: hydrology, biochemistry, plant communities, and wildlife habitat.

- Hydrology is defined as the capacity of the riverine ecosystem to store water within the soil layer and release it through subsurface flow downstream, as well as to transport nutrients and organic matter through surface runoff.

  The basic assessment model used for calculating the Hydrologic FCI is stated below. Use Equation 1 if the stream's watershed system is dominated by either forest or shrub communities, or use Equation 2 if the system is dominated by herbaceous vegetation.

$$\left[\left(CHANNELALT \times \left\{\frac{CHANNELGEO + LWDEBRIS}{2}\right\}\right)^{1/2} \times \left(\frac{COVER + SLOPE + \left\{\frac{TREE + SHRUB}{2}\right\}}{3}\right)\right]^{1/2} \quad (1)$$

$$\left[\left(CHANNELALT \times \left\{\frac{CHANNELGEO + LWDEBRIS}{2}\right\}\right)^{1/2} \times \left(\frac{COVER + SLOPE + HERB}{3}\right)\right]^{1/2} \quad (2)$$

- Biochemical Cycling is defined as the ability of the riverine ecosystem to retain and transform inorganic materials into organic forms and molecules needed to maintain biological processes within the system.

  The basic assessment model used for calculating the Biochemical Cycling FCI is stated below. Use Equation 3 if the stream's watershed system supports a tree or shrub layer of greater than or equal to ten percent cover, or use Equation 4 if the system's tree or shrub cover is less than ten percent.

$$\left[(CHANNELALT \times CHANNELGEO)^{1/2} \times \frac{\left(\frac{COVER + SLOPE}{2}\right) + \left(\frac{TREE + SHRUB}{2}\right) + \left(\frac{DETRITUS + LWDEBRIS}{2}\right)}{3}\right]^{1/2} \quad (3)$$

$$\left[(CHANNELALT \times CHANNELGEO)^{1/2} \times \left\{\frac{HERB + LWDEBRIS + \left(\frac{COVER + SLOPE}{2}\right)}{3}\right\}\right]^{1/2} \quad (4)$$

- Plant Community Functions is defined as the degree to which the riverine ecosystem supports a plant community similar in structure and composition as those found in areas representative of a natural, comparable, and undisturbed WV site.

  The basic assessment model used for calculating the Plant Community FCI is stated below. Use Equation 5 if the stream's watershed system supports a tree or shrub layer of greater than or equal to ten percent cover, or use Equation 6 if the system's tree or shrub cover is less than ten percent.

$$\left[CHANNELALT \times \left(\frac{TREE + SHRUB + COMP}{3}\right)\right]^{1/2} \quad (5)$$

$$(CHANNELALT \times HERB)^{1/2} \quad (6)$$

- Wildlife Habitat is defined as the capacity of the riverine ecosystem to provide the critical requirements to support the selected components of both vertebrate and invertebrate wildlife communities. This category is based on the capacity as it is related to the avian and amphibian communities.

The basic assessment model used for calculating the Wildlife Habitat FCI is stated below. Use Equation 7 if the stream's watershed system supports a tree or shrub layer of greater than or equal to ten percent cover, or use Equation 8 if the system's tree or shrub cover is less than ten percent.

$$\left[CHANNELALT \times \left(\frac{COVER + CHANNGEO + SED + TREE + DETRITUS + LWDEBRIS}{6}\right)\right]^{1/2} \quad (7)$$

$$\left[CHANNELALT \times \left(\frac{COVER + HERB + SED + CHANNGEO + LWDEBRIS}{5}\right)\right]^{1/2} \quad (8)$$

See Appendix B for additional information as to how these functional categories were selected and evaluated.

2.2.1.1 Mitigation Requirements

The IFAA does not discuss how the assessment is used to determine mitigation requirements. However, the assessment provides a set of eleven indicators to evaluate on any given stream, including potential or actual impact and mitigation sites. Each indicator is scored and integrated into a basic assessment model to evaluate the Functional Capacity Index (FCI) of each category. The indicators are scaled from zero to one, where one represents a fully functional condition of the stream or reach. The indicators used are as follows:

- Stream Channel Alterations (CHANNELALT): This indicator reflects either natural or man-made alterations of the channel's natural hydrology due to activities within the stream channel, such as: ditches, dams, stream crossings, culverts, and down-cutting or channel entrenchment. Use Table A.1 to determine a score for each hydraulic alteration used to calculate a weighted average for the entire impacted reach.

Table A.1
Stream Channel Alterations (CHANNELALT)

Type of Alteration	Score
Unaltered	1
Restored	0.75
Incised, or excess sediment in channel	0.5
Dammed	0.1
Channelized/straightened	0.1
Channel >50% filled	0

- Average Percent Slope of the Watershed (SLOPE): This indicator reflects anthropogenic alterations to the natural slope of the headwater watershed. Use Table A.2 to determine the indicator score for the SLOPE. If the watershed is extremely variable (contains three or more categories identified in Table A.2) determine a weighted average using the percent of the watershed for each category.

Table A.2
Average Percent Slope of the Watershed (SLOPE)

Percent Slope	Score
30 - 45 or unaltered	1
20 – 29 or 46 – 65	0.75
10 – 19	0.5
5 – 9 or 66 – 90	0.25
Less than 5	0.1

- Stream Sediment Size (SED): This indicator reflects the predominant particle size of materials comprising the surface of the streambed. Use Table A.3 to determine the indicator score for the SED. If the SED is extremely variable, determine a weighted average for the score.

Table A.3
Stream Sediment Size (SED)

USDA Soil Texture	Score
Boulders, stones, cobbles (>3 in.)	1
Gravel (3/4 – 3 in.)	0.75
Sand	0.5
Silt	0.1
Clay/Pavement/Bedrock	0.1

- Land Cover within the Watershed (COVER): This indicator reflects the surface water runoff potential due to increased disturbance and/or impervious surfaces from the surrounding watershed. Determine the score by estimating the percent of the watershed and the riparian zone cover, using the cover types in Table A.4, and calculating a weighted average.

Table A.4
Land Cover within the Watershed (COVER)

Land Cover	Score
Forest	1
Shrub	0.75
Orchards	0.5
Pasture or Hay	0.25
Urban, roads	0

- Average Percent Cover of Trees (TREE): This indicator reflects the average percent cover of trees (woody plants with a diameter at breast height [dbh] greater than or equal to three inches) in the watershed surrounding the stream. Use Table A.5 to determine a score for each area within the watershed and riparian area that differs in the percent TREE cover and calculate a weighted average.

Table A.5
Average Percent Cover of Trees (TREE)

Percent	Score
> 90	1
70 – 90	0.75
50 – 69	0.5
20 – 49	0.25
10 – 19	0.1
< 10	0

- Shrub Cover (SHRUB): This indicator reflects the average percent cover of woody vegetation in the surround watershed that is greater than 39 inches in height and less than 3 inches dbh. Use Table A.6 to determine a score for each area within the watershed and riparian area that differs in percent SHRUB cover and calculate a weighted average.

Table A.6
Average Percent Cover of Shrubs (SHRUB)

Percent	Score
> 50	1
20 – 50	0.5
10 – 19	0.25
< 10	0

- Average Percent Cover of Herbaceous Vegetation (HERB): This indicator reflects the average percent cover of herbaceous vegetation, regardless of height, and woody vegetation, less than 39 inches in height, within the surrounding watershed. Use Table A.7 to determine a score for each area within the watershed and riparian area that differs in percent HERB cover and calculate a weighted average.

Table A.7
Average Percent Cover of Herbaceous Vegetation (HERB)

Percent	Score
70 – 100	0.1
< 70	0

- Vegetation Composition and Diversity (COMP): This indicator reflects the concept that the diversity of the tallest vegetative layer is a good indicator of the overall community's existing and future canopy composition. If either TREE or SHRUB is less than ten percent, then the COMP indicator score is zero. Use Table A.8 to determine the COMP score.

Table A.8
Number of Native Species (COMP)

Number	Score
5 or more species	1
4 species	0.75
3 species	0.5
2 species	0.25
1 species	0.1
0 species	0

- Soil Detritus (DETRITUS): This indicator reflects the short term accumulations of organic matter from the vegetation present within the watershed. When TREE or SHRUB is greater than ten percent, use Table A.9 to determine the DETRITUS score.

Table A.9
Soil Detritus (DETRITUS)

Percent Cover	Score
> 75	1
50 – 75	0.75
25 – 49	0.5
10 – 24	0.25
< 10	0.1

- Large Woody Debris in Channel (LWDEBRIS): This indicator reflects the number of down logs within the stream channel per 1000 feet. The log must be at least 39 inches in length (unless the channel width is less than 39 inches, then the log must span the entire channel) and 3 inches in diameter (with the portion of the log meeting the requirements to be in-stream). Use Figure A.1 to quantify the score proportional to the quantity of logs within 1,000 feet of stream.
- Stream Channel Geomorphology (CHANNGEO): This indicator reflects the direct alteration of the natural geomorphic structure of the channel and is quantified by averaging the channel slope and the frequency of step-pools. If the slope and number of step-pools widely vary along the reach, determine a weighted average for the score. Use Table A.10 to determine the indicator score for CHANNGEO.

Table A.10
Stream Channel Geomorphology (CHANNGEO)

Slope and Pools	Score
> 4% slope with many step pools	1
2 – 4% slope with common step pools	0.5
1 – 1.9% slope with few step pools	0.1
< 1% slope with no step pools	0

2.2.1.2 Determination of Mitigation Credits

As mentioned above, the IFAA does not specifically state how to use the evaluated variables for policy or mitigation requirement. The interim assessment simply provides a Functional Unit for each assessed stream. The assessment procedure is as follows:

- Identify the Assessment Site on a topographic map, including the affected stream reach and its associated watershed.
- Assign an identifier to each assessment area. Using the indicator scoring system, complete the High Gradient Stream Approach assessment sheets (Appendix B). Include photos and notes of each assessment area.
- Using the High Gradient Stream Approach spreadsheet (Appendix B), enter the all values into the spreadsheet and calculate the FCI for each category. Make sure to save and print copies of the spreadsheets, photos, photo descriptions, original data sheets, and any other pertinent material.
- Summarize the assessment by converting to Functional Units by multiplying the FCI for each category by the affected stream length.

2.2.1.3 Summary of the IFAA

The IFAA is an interim assessment method, which applies the same scientific concepts used in the US Environmental Protection Agency's (USEPA's) *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, Second Edition* ("RBP method," Barbour et al., 1999) and in standard hydrogeomorphic assessment methods (Smith et al., 1995), to measure stream condition to infer ecologic function. The IFAA provides an assessment for structure of the stream, its associated riparian area, and its watershed. The interim assessment method states that it should be used in combination with biological and/or water quality assessments to fully assess the potential of ecological functioning.

Using professional experience, published literature, and similar rating scales, the IFAA was designed by the USACE to rapidly and easily visually assess the system on key processes. In addition, it reflects the status of the system's condition and its interaction with the surrounding geology, hydrology, and biological communities and the physical processes within those systems.

A comprehensive stream assessment method is in the process of development. A functional profile that describes the physical, chemical, and biological characteristics of the ecosystem will be developed by utilizing reference sites that encompass the variability within a region. The regional comprehensive hydrogeomorphic assessment method model for streams is expected to be completed in 2010. Until the release of the comprehensive model, the USACE recommends the IFAA as a useful, cost-effective, and scientifically valid tool for use in high gradient headwater streams in West Virginia.

2.3 Virginia United Stream Methodology (USM)

2.3.1 Stream Function

The USM (USACE, 2007), used in Virginia, takes a mechanistic approach to assessing high and low gradient stream function through the use of a Reach Condition Index (RCI). Outlined below, the assessment requires the length of the assessed reach and the determination of four Condition Indices (CIs): (1) channel conditions, (2) riparian buffer, (3) in-stream habitat, and (4) channel alteration. Under the USM, it is allowable to divide a reach into several reaches, termed Stream Assessment Reaches (SARs), if necessary, to properly delineate changes in stream condition. Each of the four CIs

are assessed on perennial and intermittent channels; however, the USM states that only the riparian buffer CI is to be assessed on ephemeral channels.

- Channel Condition: Rated on a scale of 1.0 to 3.0. The score is based on degree of incision, connection to the floodplain, visible erosion, or sediment deposition.
- Riparian Buffer: Rated on a scale of 0.5 to 1.5. The score is based on the degree of canopy cover, diameter of the trees in the canopy, type and quality of understory vegetation, and percent of impervious cover.
- In-stream Habitat: Rated on a scale of 0.5 to 1.5. The score is based on the quantity and variety of substrate sizes and in-stream structures, embeddedness of substrate material, presence of leaf and woody debris, shade protection, and presence of the hyporheic zone within 12 inches of the ground surface. This parameter differentiates between high gradient streams (generally Mountain and Piedmont streams) and low gradient streams (generally Coastal Plain streams). It was noted that high gradient streams may lack submerged aquatic vegetation while low gradient streams may not contain riffles. Neither instance should necessarily lower the habitat rating.
- Channel Alteration: Rated on a scale from 0.5 to 1.5. The score is based on the degree to which the stream has been channelized or straightened, stream crossing impacts, areas with riprap or concrete banks, manmade embankments, constrictions to stream channel or adjacent floodplain, and livestock impacts.

The above data are combined on Virginia's Stream Assessment Form, which calculates the RCI by summing the CIs for the stream and dividing by five on intermittent and perennial streams or dividing by two on ephemeral streams to get an average score (with channel condition weighted double the other factors). Each assessed stream reach will have a calculated RCI. If multiple reaches are assessed, the results from each Stream Assessment Form are combined on a Stream Assessment Summary Form (sample forms are provided in Appendix C).

2.3.2 Mitigation Requirements

To determine the impact associated with a proposed project, the USM requires the determination of an Impact Factor (IF). IFs range from zero to one, with an IF of 1.0 representing an activity that removes essentially all beneficial functions of the stream. Typical conditions found in impacted streams and their associated IF ranges in the USM are described below:

- Severe (rated 1.0): elimination or filling of stream channel, impoundments, armoring stream beds (concrete gabions, concrete blocks, riprap, countersunk and non-countersunk culverts), or channel alteration.
- Significant (rated 0.75): armoring stream beds (concrete gabions, concrete blocks, riprap, bottomless culverts and similar structures).
- Moderate (rated 0.5): bridges with piers in the stream channel (it is at the discretion of the regulator to determine if the piers result in stream channel impacts).
- Negligible (rated 0): bridges or other structures associated with roadways and trails causing no permanent impacts to stream channels, including no riprap lining, no piers, no widening or constriction of stream channels.

The USM approach to determining stream impacts is an extension of its stream assessment protocols. Once the RCI has been determined, it is multiplied by the length of the impact (LI) in linear feet (LF) and the IF. This product is called the Compensation Requirement (CR) and is calculated on a Stream Impact Assessment Form. If multiple reaches are assessed, the CR is determined using the Stream

Assessment Summary Form (see Appendix C) that combines the results of all of the assessed reaches to determine a total CR for the project.

For example, if a single stream with an RCI of 1.0 was to be filled in (IF of 1.0) for a distance of 1,000 feet (LI equals 1,000 LF), the Compensation Requirement (CR) for the site would be 1,000.

The USM allows for the evaluation of other stream impacts through best professional judgment. Also, if multiple impacts occur within a SAR, the highest applicable SAR is used for that reach.

2.3.3 Determination of Mitigation Credits

In the USM, a pre-compensation evaluation and stream conceptual mitigation plan is developed to allow regulators to determine if the plan is acceptable for compensatory mitigation. The state provides a list of 17 questions to determine if a proposed mitigation site is appropriate for use in stream mitigation. The questions are summarized below:

- What is the stream name?
- What is the reach length? (a topographic map showing the location of the stream is requested)
- What is the stream order?
- What is the drainage area?
- What is the existing and proposed land use?
- What is the condition of the existing riparian buffer?
- What is the bankfull width?
- What is the bankfull height?
- Is the channel low gradient or high gradient?
- Does the channel have "natural" sinuosity or has it been straightened or otherwise altered?
- Is the channel aggrading, degrading, or stable?
- How is the sediment supply? (e.g., extreme, very high, high)
- Are the streambanks eroding? (if so, describe the percentage of the reach that is degrading)
- Are headcuts present?
- What are the existing stream deficiencies and how they can be remedied?
- What are the mitigation goals for the reach and how will the mitigation plan meet those goals and objectives?
- What additional information is available about the existing condition of the stream? (use the Stream Impact Assessment Form, if necessary)

Several questions provide background information on the stream. Others relate to the current condition of the stream and include surrounding land use, as well as many of the questions used in the stream assessment guidance (including questions about bankfull height, riparian buffer, stream gradient, channelization, and evidence of channel alteration).

The next step in the USM process is the development of a Conceptual Compensatory Mitigation Plan. This is used to determine the Compensation Credit. The plan is divided into the following sections:

- Restoration: Lists background data and the length (LF) proposed for restoration.

- Enhancement: Lists the length (LF) of stream channel expected to benefit from and be influenced by in-stream structures and habitat structures and the streambank lengths that will have bankfull bench creation, laid back banks, bioremediation techniques, or streambank planting.
- Riparian Buffer: Determines the percentage of the inner and outer 100-foot buffers on each stream side that will be re-established, planted heavily, have light or supplemental plantings, or will be preserved.
- Adjustment Factors: Describes practices that can be used to reward certain restoration practices such as preserving endangered species, establishing wildlife corridors, excluding livestock access to streams, and preserving watersheds.

Compensation Credits (CCs) are determined from a Stream Compensation Plan. CCs are determined according to the length of stream affected by the improvements, the type of improvements (restoration or enhancement), the degree of buffer improvement, and the type of in-stream structures used.

In the USM, restoration receives 1.0 credit per linear foot. The USM defines restoration as the process of converting an unstable, altered, or degraded stream corridor, including the flood-prone area, to a natural, stable condition, considering the recent and future watershed conditions. The USM allows for Rosgen Priority 1 restoration (re-establishing the stream in its previous floodplain), Rosgen Priority 2 restoration (re-establishing the stream in a new floodplain), or Rosgen Priority 3 restoration (restoration of a stream within a flood-prone area without reconnecting the stream to its previous floodplain). The following restoration restrictions are in place:

- No enhancement activities can be coupled with restoration on the same linear foot of stream channel
- To be eligible for restoration credit, the restoration must address each of the following: dimension, pattern, and profile (with the exception of Priority 3 Restoration, which may not address pattern). Otherwise, if only two of the three parameters are addressed, the project is classified as enhancement.

In the USM, enhancement activities receive between 0.1 and 0.3 credits per linear foot depending on the type of enhancements proposed. Enhancements can include physical alterations to the channel that do not constitute restoration, but that directly augment channel stability, water quality, and stream ecology in accordance with a reference condition. The USM lists six activities that are included in the enhancement category: in-stream structures, habitat structures, bankfull bench creation, lay back banks, bioremediation techniques, and streambank planting.

- In-stream Structures: Includes cross vanes, J-hook vanes, native material revetments, W-rock weirs, log-lanes, and step pools. These structures generate 0.3 CCs per foot of effect. Other in-stream structures are considered on a case-by-case basis.
- Habitat Structures: Specifically designed for habitat creation and do not contribute to channel stability, including submerged shelters, fish boards, bank cover, floating log structures, root wads, and half-log cover. These structures generate 0.1 CC per foot of effect. Riffle and pool complexes and overhanging vegetation do not qualify for enhancement credit.
- Bankfull Bench Creation: Involves the creation of a bankfull bench along one or both streambanks. The activity does not meet entrenchment ratio guidelines, but does result in a stable channel. Bankfull bench creation generates 0.15 CC per foot of bench created.

- Lay Back Banks: Describes the manipulation of the bank slope that does not create a bankfull bench or floodplain, e.g., grading to a 2:1 slope. This activity generates 0.1 CC per foot of banks laid back.
- Bioremediation Techniques: Relate to the use of coir logs or other, similar materials to stabilize streambanks. While several types of these materials may be applied along a specific reach, only one credit per length of stream is allowed. The activity generates 0.1 CC per foot of streambank.
- Streambank Planting: Installation of plants (not seeds) along the immediate streambank area. Plantings include live stakes, dormant post/stakes, branch layering, and other plant installation methods and generate 0.09 CC per foot of bank planted.

2.3.4 Summary of the USM Approach

USM assessments rely on a visual estimate of physical characteristics for both high and low gradient streams. Because it has been developed relatively recently, this method builds on lessons learned from previously published guidelines in Kentucky, North Carolina, and Georgia. The USM includes language pertaining to headwater streams such as those in this project, and the protocol is based on a functional assessment.

The USM also provides a method for determining the amount of mitigation credits required from unavoidable impacts. Furthermore, the USM provides the link to determine how many credits a mitigation project can obtain through restoration, enhancement, and preservation; a method that currently does not exist in West Virginia. Most of the credit-generating activities can be documented in the as-built plan sheets and mitigation plan, allowing for easy verification of credit generation. Both the mechanics and the biological functions of the stream are eligible to generate credits.

3.0 FUNCTIONS OF STREAMS

This section provides background information on the functions of streams, for use in describing both potential impacts to streams and potential restoration measures. To mitigate and offset impacts to streams, restoration goals should seek to not only compensate for physical losses (length), but also the loss of functions provided by streams. While quantifying physical losses on the basis of length is straightforward, the quantification of functional losses is more difficult and is the subject of much on-going research.

To address the restoration of stream functions, it is first necessary to describe the functions that streams provide. Many functions of streams have been proposed in the scientific literature and include: influence on downstream water quality (Alexander et al., 2007); aquatic and terrestrial habitats (Meyer et al., 2007); hydrologic connectivity (Nadeau and Rains, 2007); and sediment transport processes (May, 2007). The USACE has proposed a framework of stream functions described by Fischenich (2006) for determining and evaluating objectives for stream restoration projects. This functional framework has a scientific basis in primary functions, is based on processes and interactions, and attempts to describe the interactions between identified functions.

The Fischenich (2006) functional framework for evaluating streams and stream restoration projects identifies a suite of 15 functions critical to the sustenance of stream and riparian ecosystems. These functions are summarized in Table A.1. Also presented in Table A.1 is Baker's assessment of whether certain functions are supported by ephemeral, intermittent, and/or perennial channels, and to what level they are supported. In summary, most available research indicates that all 15 functions are supported to varying degrees by intermittent and perennial channels. Ephemeral channels support some of these functions as well; however, they are supported at a much reduced level due to the lack of water in these channels for extended periods of time, lack of aquatic populations, and lack of bi-directional exchange with surface and ground water.

Table A.1
Primary Functions for the Sustenance of Stream and Riparian Ecosystems (after Fischenich, 2006)

Function	Description	Level at Which Function is Supported By Ephemeral (E), Intermittent (I), or Perennial (P) Channels		
		E	I	P
1) Maintain Stream Evolution Processes	Maintains appropriate energy levels, promotes diversity and variability of biotic communities.	partial	full	full
2) Energy Management Processes	Allows for conversion between potential and kinetic energy through changes in the system.	partial	full	full
3) Provide for Riparian Succession	Changes in vegetation structure promote diversity and ecological vigor, vegetation necessary for system stability and nutrient cycling.	partial	full	full
4) Surface Water Storage Processes	Provides temporary water storage during high flows, regulates soil moisture, provides pathway for aquatic organism movement, and provides contact time for biogeochemical processes.	minimal	partial	full
5) Maintain Surface / Subsurface Water Connections and Processes	Provides bi-directional exchange from open channel to subsurface soils, allows exchange of chemicals, nutrients, and water.	none	partial	full
6) General Hydrodynamic Balance	Provide proper flow conditions at the appropriate seasons for support of the biotic community.	minimal	full	full
7) Sediment Continuity	Provides for appropriate erosion, transport, and deposition processes.	partial	full	full
8) Maintain Substrate and Structural Processes	Provide substrates and structural architecture to support diverse habitats and biotic communities.	partial	full	full
9) Quality and Quantity of Sediments	Sediment yield and character are primary variables in determining the physical character of the system.	partial	full	full
10) Support Biological Communities and Processes	Provides for diverse assemblages of native species.	none	full	full
11) Provide Necessary Habitats	Produces and sustains habitats to support vigorous aquatic and riparian biotic communities.	minimal	full	full
12) Maintain Trophic Structures and Processes	Promotes growth and reproduction of biotic communities across trophic levels.	partial	full	full
13) Maintain Water and Soil Quality	Riparian communities trap, retain, and remove particulate and dissolved constituents of surface and overland flow.	partial	full	full
14) Maintain Chemical Processes and Nutrient Cycles	Provides for complex reactions to maintain equilibrium and supply required elements to biota.	partial	full	full
15) Maintain Landscape Pathways	Maintains connectivity to allow for biotic and abiotic energy process pathways.	partial	full	full

The functions characterized by Fischenich (2006) were ordered into a hierarchy of functions, where the relative significance of each function was inferred by assessing the interrelations among functions. Functions that affect the greatest number of other functions were ranked highest; while functions that have the least effect on other functions were ranked lower (Table A.2). For example, the hydrodynamic balance of a site (#1), which describes a system's flow characteristics, supports directly or indirectly all other functions listed in the framework. In contrast, the habitat provided by a site (#15) directly affects three other functions which are all related to the biological systems supported by streams.

Table A.2
Rankings of Functions Proposed by Fischenich

Function	Functions Directly Affected	Functions Indirectly Affected
1) General Hydrodynamic Balance	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15	13
2) Maintain Stream Evolution Processes	1, 3, 4, 5, 6, 7, 8, 10, 11, 12, 14, 15	9, 13
3) Surface Water Storage Processes	1, 4, 6, 10, 11, 12, 14, 15	2, 5, 7, 8, 9, 13
4) Sediment Continuity	3, 5, 6, 7, 8, 9, 11, 15	1, 13, 14
5) Provide for Riparian Succession	1, 2, 3, 4, 6, 12, 14, 15	9, 13
6) Energy Management Processes	1, 2, 3, 4, 5, 7, 8, 15	--
7) Maintain Substrate and Structural Processes	1, 2, 4, 6, 7, 10, 15	5, 9, 11, 13
8) Quality and Quantity of Sediments	2, 4, 5, 6, 7, 10, 15	1, 9, 11, 14
9) Support Biological Communities and Processes	5, 11, 13, 14, 15	1, 2, 3, 7, 8, 10, 12
10) Maintain Surface / Subsurface Water Connections and Processes	1, 5, 11, 15	3, 9, 12, 13
11) Maintain Water and Soil Quality	8, 9, 13, 14	5
12) Maintain Landscape Pathways	9, 13, 14, 15	6
13) Maintain Trophic Structures and Processes	9, 11, 14	8
14) Maintain Chemical Processes and Nutrient Cycles	8, 9, 13	6
15) Provide Necessary Habitats	9, 12, 13	--

As shown in Table A.2, stream and riparian functions are interrelated through complex linkages. The hierarchy can be used to indicate which functions are most critical to address during restoration. Using the hierarchy, emphasis can be placed on the functions which are most interrelated to other necessary functions. These most critical functions include those that address hydrodynamic processes (#1, 3, 6), sediment transport processes (#4, 7), stream stability (#2), and riparian buffer restoration (#5, 11). Focusing mitigation efforts on fundamental functions and processes will provide a greater likelihood that the restored streams will be capable of supporting other, more dependent functions. These more dependent functions typically require more time to establish and include diverse biological communities (#9), chemical and nutrient processes (#14), diverse habitats (#15), and improved water and soil quality (#11). Table A.3 summarizes various restoration techniques and design procedures for different stream functions.

Table A.3
Summary of Restoration Techniques and Design Procedures for Different Stream Functions

Function	Description	Restoration Techniques and Design Procedures for Intermittent and Perennial Channels	Restoration Techniques and Design Procedures for Ephemeral Channels
1) General Hydrodynamic Balance	Provide proper flow conditions at the appropriate seasons for support of the biotic community.	Restoration of an active floodplain; channels sized to carry the bankfull discharge; restoration of adjacent wetlands; providing for contact with groundwater.	Size channel appropriately for watershed; provide channel connectivity with downstream reaches.
2) Maintain Stream Evolution Processes	Maintains appropriate energy levels, promotes change that maintains diversity and succession, provides genetic variability and species diversity of biotic communities.	Restoration of an active floodplain designed to accommodate the bankfull discharge; restoration of alternating riffle / pool sequences; restoration of diverse bed profile and substrate; use of structures to develop and maintain diverse aquatic habitats; establishing a riparian buffer and planting a diverse vegetative community.	Use of grade control structures to reduce potential for channel incision; restoration of riparian buffers and planting a diverse vegetative community.
3) Surface Water Storage Processes	Provides temporary water storage during high flows, regulates soil moisture, provides pathway for aquatic organism movement, maintains base flow and low-velocity habitats, provides contact time for biogeochemical processes.	Restoration of an active floodplain; restoration of adjacent riparian wetlands, floodplain pools, and diverse vegetation; restoration of diverse bed profile, substrate and riffle/pool habitat.	Use of natural substrates and large woody debris in the restored streambed; restoration of natural bed profile.
4) Sediment Continuity	Provides for appropriate erosion, transport, and depositional processes, provides for the establishment and succession of aquatic and riparian habitats.	Sediment transport analyses of design channels; placement of in-stream structures to promote bed scour and bar development; bank stabilization practices that minimize bank erosion; establish natural vegetative community.	Provide channel connectivity with downstream reaches; restoration of stream buffers to reduce erosion.
5) Provide for Riparian Succession	Changes in vegetation structure promote diversity and ecological vigor, vegetation necessary for system stability, woody debris recruitment and nutrient cycling.	Establishment of stream-side buffers and riparian corridors; vegetation planting; live staking; bioengineering practices; allowing successional growth; using woody debris as in-stream structures.	Establishment of stream-side buffers and riparian corridors; vegetation planting; live staking; bioengineering practices; allowing successional growth; using woody debris as in-stream structures .
6) Energy Management Processes	Allows for conversion between potential and kinetic energy through changes in the system.	Restoration of alternating riffle / pool sequences; variable cross-section dimensions between riffles and pools; use of in-stream structures to provide energy dissipation and oxygenation of flows; restoration of a diverse bed profile.	Size channel appropriately for watershed; use of structures for grade control, energy dissipation and oxygenation of flows.

Function	Description	Restoration Techniques and Design Procedures for Intermittent and Perennial Channels	Restoration Techniques and Design Procedures for Ephemeral Channels
7) Maintain Substrate and Structural Processes	Provide substrates and structural architecture to support diverse habitats and biotic communities.	Restoration of alternating riffle / pool sequences; establish proper channel size and use in-stream structures to provide grade control and promote substrate sorting; restoration of wooded riparian buffers; use of in-stream structures to introduce and trap woody debris and leaves.	Provide channel connectivity with downstream reaches; use of natural substrates.
8) Quality and Quantity of Sediments	Sediment yield and character are primary variables in determining the physical character of the system.	Identification of restoration sites that are not in highly impacted watersheds; stabilization techniques for restored streambanks; restoration of riparian vegetation to reduce sediment from watershed; design of stabilized outlets for concentrated runoff.	Identification of restoration sites that are not in highly impacted watersheds; stabilization techniques for restored streambanks; restoration of riparian vegetation to reduce sediment from watershed.
9) Support Biological Communities and Processes	Provides for diverse assemblages of native species and preservation of populations. Maintains ecological relationships, physiological conditions, genetic diversity and population structure.	Restoration of alternating riffle / pool sequences; restoration of an active floodplain; use of in-stream structures to promote stability, diverse bedforms and heterogeneity of habitat; restoration of diverse vegetation within riparian buffers; use of in-stream structures to introduce and trap woody debris and leaves.	Not applicable
10) Maintain Surface / Subsurface Water Connections and Processes	Provides bi-directional exchange from open channel to subsurface soils, allows exchange of chemicals, nutrients, and water.	Locate channels to intercept groundwater; use of natural substrates to allow bi-directional exchange; use of liners to establish shallow water tables and reduce losses to deep percolation.	Not applicable
11) Maintain Water and Soil Quality	Riparian communities trap, retain, and remove particulate and dissolved constituents of surface and overland flow.	Restoration of riparian buffers by planting diverse plant species; identification of restoration sites in watersheds not likely to be impacted in the future or address entire watershed.	Restoration of riparian buffers.
12) Maintain Landscape Pathways	Maintains connectivity to allow for biotic and abiotic energy process pathways.	Provide connectivity between ephemeral, intermittent, and perennial stream segments; restoration of contiguous riparian buffers; provide appropriate flow regimes in channels.	Provide channel connectivity with downstream reaches.

Function	Description	Restoration Techniques and Design Procedures for Intermittent and Perennial Channels	Restoration Techniques and Design Procedures for Ephemeral Channels
13) Maintain Trophic Structures and Processes	Promotes growth and reproduction of biotic communities across trophic levels.	Restoration of alternating riffle / pool sequences; restoration of a diverse bed profile; restoration of riparian buffers to provide organic matter and detritus; use in-stream structures to introduce and trap woody debris and leaves.	Restoration of riparian buffers to provide organic matter and detritus for conveyance downstream.
14) Maintain Chemical Processes and Nutrient Cycles	Provides for complex reactions to maintain equilibrium and supply required elements to biota.	Restoration of diverse bed profile and substrate; Restoration of diverse riparian buffers with native species to provide organic matter and detritus; use in-stream structures to introduce and trap woody debris and leaves.	Restoration of diverse riparian buffers with native species
15) Provide Necessary Habitats	Produces and sustains habitats to support vigorous aquatic and riparian biotic communities, and provides key temporal habitats.	Restoration of diverse riparian buffers with native species; restoration of a diverse bed profile; restoration of alternating riffle / pool sequences; design of stable channel dimension, pattern, and profile; use of in-stream structures to promote stability, diverse bedforms and heterogeneity of habitat.	Restoration of diverse riparian buffers with native species; use of natural substrates.

For the purposes of this Mitigation Plan, CONSOL has used a simplified functional categorization, dividing Fishenich's 15 functions into five main categories: hydrology, hydraulics, geomorphology, biology, and water quality. Each of the five categories can be measured by standard scientific assessments and engineering models. Table A.4 provides a summary of the most practicable methodologies for assessment of the function categories and subcategories. CONSOL assessed each of these stream function categories at both the impact and proposed mitigation areas for the proposed project. Figure A.2 shows a summary pyramid of these functions.

Table A.4
Summary of Identified Functions Assessed for Buffalo Mountain Surface Mine

Category	Sub-Category	Function	Measurement	Model and/or Reference
1.Hydrology	1. Rainfall / Runoff Relationship	Contributes to channel development and size. Produces a range of discharges from baseflow to flood flows. Includes the channel forming discharge. For perennial and some intermittent streams the bankfull discharge creates the long-term stable channel morphology.	Measures the amount of water received by a channel. Discharge estimates are typically made for the 2, 5, 10, 25, 50, and 100 year storm events	IFAA; TR55; HEC-HMS; Regional Curves
2. Hydraulics	2. Stage-Discharge Relationships	Transport of water at varying stages from baseflow to flood flows. Affects the size and shape of the channel.	Velocity, shear stress, stream power	Mannings equation, HEC-RAS
3. Geomorphology	3a. Sediment Transport	The ability of a stream to move the sediment size and load so that over time the bed does not aggrade or degrade.	Sediment transport competency and capacity	HEC-RAS; Andrews 1984; Rosgen 2006
	3b. Bedform Diversity	Creation of riffles or steps, pools, runs, and glides. Affected by all functions above.	Percent riffle and pool, profile depth variability, grain size distributions	IFAA; RBP; USM; (Rosgen 2006)
	3c. Channel Stability	The ability of a stream to remain stable without incising or aggrading.	Dimension, pattern, and profile; Channel evolution	BHR, ER, W/D, RC/W, MWR, P-P spacing, BEHI; Rosgen 2006
4. Biology	4a. Aquatic Habitats	Supports aquatic life for macroinvertebrates.	Habitat assessment studies, Large woody debris surveys, Macroinvertebrate	IFAA; RBP; WVSCI; USM; Davis et al. 2001
	4b. Terrestrial Habitats	A riparian corridor provides bank stability, wood recruitment for the stream, and habitat for terrestrial animals. It also provides a wildlife corridor.	Habitat assessment studies, Large woody debris surveys, Vegetation surveys	IFAA; RBP; USM; CVS-EEP; Davis et al. 2001; Mills & Stevenson, 1999
5. Water Quality	5a. Basic Chemistry	Basic chemistry, such as pH, dissolved oxygen, and conductivity, along with other metals provide a snap shot of water quality and the ability to support aquatic life.	Physical and chemical water quality analysis	RBP

Category	Sub-Category	Function	Measurement	Model and/or Reference
	5b. Nutrient cycling	The downstream processing of organics and nutrients, including decomposition and retention.	% shredders, Degree of organic pollution, Large woody debris surveys	WVSCI; RBP; HBI; Davis et al. 2001

4.0 APPLICATION OF FLUVIAL PROCESSES TO STREAM RESTORATION

A stream and its floodplain (referred to here as the riparian area) comprise a dynamic environment in which the floodplain, wetland areas, channel, and bedform evolve through natural processes. Weather and hydraulic processes erode, transport, sort, and deposit alluvial materials throughout the riparian system. The size and flow of a stream are directly related to its watershed area. Other factors that affect channel size and stream flow are geology, land use, soil types, topography, and climate. The morphology, or size and shape, of the channel reflect all of these factors (Leopold et al., 1964; Knighton, 1998). Under stable conditions, the result is a dynamic equilibrium in which the stream maintains its dimension, pattern, and profile over time. Changes in watershed land use, including increases in imperviousness and removal of riparian vegetation. A new equilibrium may eventually result, but not before large adjustments in channel form can occur, such as extreme bank erosion or incision (Lane, 1955; Schumm, 1960). By understanding and applying the processes of fluvial form and function to stream restoration projects, a self-sustaining riparian system that maximizes ecosystem function and potential can be designed and constructed.

The following sections describe the processes that were used when developing stream restoration projects using natural channel design concepts.

4.1 Considerations for Ephemeral Channels

SMCRA defines an ephemeral stream channel as "a stream which flows only in direct response to precipitation in the immediate watershed or in response to the melting of a cover of snow and ice, and which has a channel bottom that is always above the local water table." In mountain environments, ephemeral channels are found on steep slopes near the boundaries of watersheds, and route surface runoff to down-gradient intermittent and perennial channels. Often, these channels are poorly defined and do not exhibit fluvial features such as sorted bed material and complex bed profiles. Because these channels only carry water infrequently and for short time periods, they do not support aquatic populations and biologically function as terrestrial habitat.

The principles of fluvial processes and channel-forming discharge are most applicable to intermittent and perennial stream channels. For high-gradient ephemeral stream channels of the Appalachian Mountains, research has shown little correlation between channel size, watershed area, and a given-return period flow. Instead, ephemeral channel size and dimension are primarily controlled by valley topography, bedrock knick-points, and past disturbance (Adams, 2002). For this reason, the sections below that discuss the design of channel dimension, pattern, and profile for intermittent and perennial channels do not apply to the design of ephemeral channels.

Baker's design approach for ephemeral channel restoration is to convey ephemeral flows in a way that does not cause excess degradation or erosion of the hillslope. Channels are sized to accommodate the two- to five- year return period, 24-hour storm event. Grade control structures are included where appropriate to protect the channels from incision, excess erosion, and gullying. Emphasis is also placed on restoring riparian vegetation adjacent to the channels, to provide bank and channel stability and provide a source of organic debris to intermittent and perennial receiving waters downstream.

4.2 Channel-Forming Discharge

The channel-forming discharge, also referred to as bankfull discharge, effective discharge, or dominant discharge, creates a natural and predictable channel size and shape (Leopold et al., 1964; Leopold, 1994). Channel-forming discharge theory proposes that there is a unique flow that over a long period of time would yield the same channel morphology that is shaped by the natural sequence of flows. At this discharge, equilibrium is most closely approached, and the tendency to change is least (Inglis, 1947). Uses of the channel-forming discharge theory include channel stability assessment, river management using hydraulic geometry relationships, and natural channel design (Soar and Thorne, 2001).

Proper determination of bankfull stage in the field is vital to stream classification and the natural channel design process. The channel-forming discharge is the point at which flooding occurs on the floodplain (Leopold, 1994). This flood stage may or may not be the top of the streambank. On average, channel-forming discharge occurs every 1.5 years (Leopold, 1994; Harman et al., 1999; McCandless, 2003). If the stream has incised because of changes in the watershed or streamside vegetation, the bankfull stage may be a small, depositional bench or scour line on the streambank (Harman et al., 1999); in this case, the top of the bank, which was formerly the floodplain, is called a terrace. A stream with terraces at the top of its banks is incised.

4.3 Bedform Diversity and Channel Substrate

The profile of a stream bed and its bed materials is largely dependent on valley slope and geology. In simple terms, steep, straight streams are found in steep, colluvial valleys, while flat, meandering streams are found in flat, alluvial valleys. Colluvial valleys have slopes between two percent and four percent while alluvial channels have slopes less than two percent. A colluvial valley forms through hillslope processes. Sediment supply in colluvial valleys is controlled by hillslope erosion and mass wasting, i.e., the sediments in the stream bed originate from the hillslopes. Sediments reaching the channel in a colluvial valley are typically poorly sorted mixtures of fine and coarse-grained materials, ranging in size from sand to boulders. In contrast, an alluvial valley forms through stream and floodplain processes. Sediments in alluvial valleys include some coarse gravel and cobble transported from steeper upland areas but are predominantly fine-grained particles, such as gravel and sand. Grain size generally decreases with valley slope (Leopold et al., 1964). The impact streams in this project are located in colluvial valleys. The mitigation streams are in a combination of both colluvial and alluvial valleys.

4.3.1 Step/Pool Streams

A step/pool bed profile is characteristic of steep streams formed within colluvial valleys. Steep mountain streams demonstrate step/pool morphology as a result of episodic sediment transport mechanisms. Because of the high energy associated with the steep channel slope, the substrate in step/pool streams contains significantly larger particles than streams in flatter alluvial valleys. Steps form from accumulations of boulders and cobbles that span the channel, resulting in a backwater pool upstream and a plunge pool downstream. Smaller particles collect in the interstices of steps, creating stable, interlocking structures (Knighton, 1998).

In contrast to meandering streams that dissipate energy through meander bends, step/pool streams dissipate energy through drops and turbulence. Step/pool streams have relatively low sinuosity. Pattern variations are commonly the result of debris jams, topographic features, and bedrock outcrops.

4.3.2 Gravel Bed Streams

Meandering gravel bed streams in alluvial valleys have sequences of riffles and pools that maintain channel slope and bed stability. The riffle is a bed feature composed of gravel or larger-size particles. During low-flow periods, the water depth at a riffle is relatively shallow, and the slope is steeper than the average slope of the channel. At low flows, water moves faster over riffles, providing oxygen to the stream. Riffles control the stream bed elevation and are usually found entering and exiting meander bends. The inside of the meander bend is a depositional feature called a point bar, which also helps maintain channel form (Knighton, 1998). Pools are typically located on the outside bends of meanders, between riffles. Pools have a flat slope and are much deeper than the average depth of the channel. At low flows, pools are depositional features, and riffles are scour features.

At high flows, the water surface becomes more uniform, i.e., the water surface slope at the riffles decreases, and the water surface slope at the pools increases. The increase in pool slope coupled with the greater water depth at the pools causes an increase in shear stress at the bed elevation. The opposite is true at riffles. With a relative increase in shear stress, pools scour. The relative decrease in shear stress at riffles causes bed material deposits at these features during the falling limb of the hydrograph.

4.4 Stream Classification

The Rosgen Stream Classification System categorizes essentially all types of channels based on measured morphological features (Rosgen, 1994, 1996). The system, illustrated in Figure A.3, presents several stream types, based on a hierarchical system. The first level of classification distinguishes between single and multiple-thread channels. Streams are then separated according to degrees of entrenchment, width/depth ratio, and sinuosity. Slope range and channel materials are also evaluated to subdivide the streams. Stream types are further described according to average riparian vegetation, organic debris, blockages, flow regimes, stream size, depositional features, and meander pattern.

Bankfull stage is the basis for measuring the width/depth and entrenchment ratios, two of the most important delineative criteria; therefore, it is critical to correctly identify bankfull stage when classifying streams and designing stream restoration measures. A detailed discussion of bankfull stage is provided in Section 4.2.

4.5 Stream Stability

A naturally stable stream must be able to transport the sediment load supplied by its watershed while maintaining dimension, pattern, and profile over time so that it does not degrade or aggrade (Rosgen, 1994). Stable streams migrate across and through landscapes slowly, over long periods of time, while maintaining their form and function. Instability occurs when scouring causes the channel to incise (degrade) or when excessive deposition causes the channel bed to rise (aggrade). A generalized relationship of stream stability proposed by Lane (1955) is shown as a schematic drawing in Figure A.4. The drawing shows that the product of sediment load and sediment size is proportional to the product of stream slope and discharge or stream power. A change in any one of these variables causes a rapid physical adjustment in the stream channel.

4.6 Channel Evolution

A common sequence of physical adjustments has been observed in many streams following disturbance. This adjustment process is often referred to as channel evolution. Disturbance can result from channelization, increase in runoff due to build-out in the watershed, removal of

streamside vegetation, and other changes that negatively affect stream stability. All of these disturbances occur in both urban and rural environments. Several models have been used to describe this process of physical adjustment for a stream. The Simon (1989) Channel Evolution Model characterizes evolution in six steps:

1) sinuous, pre-modified,
2) channelized,
3) degradation,
4) degradation and widening,
5) aggradation and widening, and
6) quasi-equilibrium.

Figure A.5 illustrates the six steps of the Simon Channel Evolution Model.

The channel evolution process is initiated once a stable, well-vegetated stream that interacts frequently with its floodplain is disturbed. Disturbance commonly causes increased in-stream power that causes degradation, often referred to as channel incision (Lane, 1955). Incision eventually leads to over-steepening of the banks, and when critical bank heights are exceeded, the banks begin to fail, and mass wasting of soil and rock leads to channel widening. Incision and widening continue moving upstream in the form of a head-cut. Eventually, the mass wasting slows, and the stream begins to aggrade. A new, low-flow channel begins to form in the sediment deposits. By the end of the evolutionary process, a stable stream with dimension, pattern, and profile similar to those of undisturbed channels forms in the deposited alluvium. The new channel is at a lower elevation than its original form, with a new floodplain constructed of alluvial material (Federal Interagency Stream Restoration Working Group [FISRWG], 1998).

4.7 Priority Levels of Restoring Incised Rivers

Though incised streams can occur naturally in certain landforms, they are often the product of disturbance. Characteristics of incised streams include high, steep streambanks; poor or absent in-stream or riparian habitat; increased erosion and sedimentation; and low sinuosity for meandering streams. Complete restoration, in which the incised channel's grade is raised so that an abandoned floodplain terrace is reclaimed, is the ideal, overriding objective of stream restoration. Such an objective may be impractical, however, when homes, roadways, utilities, or other structures have encroached upon the abandoned floodplain. A priority system for the restoration of incised streams, developed and used by Rosgen (1997), considers a range of options to provide the best level of stream restoration possible for a given setting. For this particular project, the off-site mitigation in the Hell Creek subwatershed will involve Priority 3 restoration. Figure A.6 illustrates various restoration/stabilization options for incised channels within the framework of the Rosgen priority system. Generally:

- Priority 1 – Re-establishes the channel on a previous floodplain (i.e., raises channel elevation); restores a new channel to achieve the dimension, pattern, and profile characteristic of a stable stream for the particular valley type; and fills or isolates existing incised channel. This option requires that the upstream start point of the project not be incised.
- Priority 2 – Establishes a new floodplain at the existing bankfull elevation (i.e., excavates a new floodplain); restores channel to achieve the dimension, pattern, and profile characteristic of a stable stream for the particular valley type; and fills or isolates existing incised channel.

- Priority 3 – Converts a straight channel to a different stream type while leaving the existing channel in place, by excavating bankfull benches at the existing bankfull elevation. Effectively, the valley for the stream is made more bowl-shaped. This approach uses in-stream structures to dissipate energy through a step/pool channel type.
- Priority 4 – Stabilizes the channel in place, using in-stream structures and bioengineering to decrease stream bed and streambank erosion. This approach is typically used in highly-constrained environments.

5.0 NATURAL CHANNEL DESIGN OVERVIEW

Restoration design of degraded stream reaches first involves accurately diagnosing their current condition. Understanding valley type, stream type, channel stability, sources of impairment, bedform diversity, and potential for restoration is essential to developing adequate restoration measures (Rosgen, 1996). This combination of assessment and design is often referred to as natural channel design and will be utilized where applicable for this project.

The first step in a stream restoration design is to assess the reach, its valley, and its watershed in order to understand the relationship between the stream and its drainage basin and to evaluate the causes of stream impairment. Bankfull discharge is estimated for the watershed. After sources of stream impairment are identified and channel geometry is assessed, a plan for restoration can be formulated.

Design commences at the completion of the assessment stage. A series of iterative calculations are performed using data from reference reaches, pertinent literature, and evaluation of past projects to develop an appropriate, stable cross-section, profile, and plan form dimensions for the design reach. A thorough discussion of design parameter selection is provided in Section10.0. The alignment should avoid an entirely symmetrical layout to mimic natural variability, create a diversity of aquatic habitats, and improve aesthetics.

Once a dimension, pattern, and profile have been developed for the project reach, the design is tested to ensure that the new channel will not aggrade or degrade. A discussion of sediment transport methodology is provided in Section11.0.

After the sediment transport assessment, additional structural elements are added to the design to provide grade control, protect streambanks, and enhance habitat. Section 12.0describes these in-stream structures in detail.

Once the design is finalized, detailed drawings are prepared to show dimension, pattern, profile, and location of additional structures. These drawings are used in the construction of the project.

Following the implementation of the design, a monitoring plan is established to:

- Ensure that stabilization structures are functioning properly;
- Monitor channel response in dimension, pattern and profile, channel stability (aggradation/degradation), particle size distribution of channel materials, and sediment transport and streambank erosion rates;
- Determine biological response (food chains, standing crop, species diversity, etc.); and
- Determine the extent to which the restoration objectives have been met.

6.0 GEOMORPHIC CHARACTERIZATION METHODOLOGY

Geomorphic characterization of stream features includes bankfull identification, bed material characterization and analysis, and stream classification.

6.1 Bankfull Identification

Field techniques used for bankfull identification are as follows:

- Identify the most consistent bankfull indicators along the reach that were obviously formed by the stream, such as a point bar or lateral bar. Bankfull is usually the back of this feature, unless sediment supply is high; in that case, the bar may flatten, and bankfull will be the front of the feature at the break in slope. The indicator is rarely the top of the bank or lowest scour mark.
- Measure the difference in height between the water surface and the bankfull indicator; for example, the indicator may be 2.2 feet above water surface. Bankfull stage corresponds to a flow depth. It should not vary by more than a few tenths of a foot throughout the reach, unless a tributary enters the reach and increases the size of the watershed.
- Look for bankfull indicators at a stable riffle. If a bankfull indicator is not present at this riffle, use the height measured in the previous step to establish the indicator; for example, measure 2.2 feet above water surface, and place a flag in both the right and left banks.
- Measure the distance from the left bank to the right bank between the indicators. Calculate the cross-sectional area.
- Obtain the appropriate regional curve for the project area and determine the cross-sectional area associated with the drainage area of the reach.
- Compare the measured cross-sectional area to that of the regional curve. If the measured cross-sectional area is not a close fit, look for other bankfull indicators, and test them. If there are no other indicators, look for reasons to explain the difference between the two cross-sectional areas; for example, if the cross-sectional area of the stable riffle is lower than the regional curve area, look for upstream impoundments, wetlands, or a mature forested watershed. If the cross-sectional area is higher than the regional curve area, look for stormwater drains, parking lots, or signs of channelization.

It is important to perform the bankfull verification at a stable riffle, using indicators from depositional features. The cross-sectional area will change with decreasing stability. In some streams, bankfull indicators will not be present due to incision or maintenance. In such cases, it is important to verify bankfull through other means, such as a gage station survey or reference bankfull information that is specific to the geographic location. The gage information can be used to verify the applicability of the regional curve to a localized area. For this particular project, reference bankfull information was utilized due to the absence of a nearby gage station.

6.2 Bed Material Characterization

For gravel bed systems, bed material characterizations were performed using a modified Wolman procedure (Wolman, 1954; Rosgen, 1996). A 100-count pebble count is performed in transects across the stream bed, with the number of riffle and pool transects proportional to the percentage of riffles and pools within the longitudinal distance of a given stream type. As stream type changes, a separate pebble count is performed. The median particle size of the modified Wolman procedure is known as the D50. The D50 describes the bed material classification for that reach. The Rosgen

bed material classification is shown in Figure A.3 and ranges from a classification of 1, for a channel D50 of bedrock, to a classification of 6, for a channel D50 in the silt/clay particle size range.

The modified Wolman pebble count is not appropriate for sand bed streams. When working in sand bed systems, a bulk sampling procedure is used to characterize the bed material. Cores (2" - 3" deep) are sampled from the bed along the entire reach. These cores are taken to a lab and dry-sieved to obtain a sediment size distribution. This information is used to classify the stream and to complete the sediment transport analysis.

6.3 Stream Classification

Cross-sections are surveyed along riffles for the purpose of stream classification. Values for entrenchment ratio and width/depth ratio, along with sinuosity and slope, are used to classify the stream. The entrenchment ratio (ER) is calculated by dividing the flood-prone width (width measured at twice the maximum bankfull depth) by the bankfull width. The width/depth ratio (w/d ratio) is calculated by dividing bankfull width by mean bankfull depth. Figure A.7 shows examples of the channel dimension measurements used in the Rosgen Stream Classification System.

Finally, the numbers that coincide with each bed material classification are used to further classify the stream type; for example, a Rosgen E3 stream type is a narrow and deep, cobble-dominated channel, with access to a floodplain that is greater than two times its bankfull width.

7.0 CHANNEL STABILITY ASSESSMENT METHODOLOGY

Evaluation methods from the stream stability assessment methodology developed by Rosgen (2001) were used for this project. The Rosgen method is a field assessment of the following stream channel characteristics:

- Stream channel condition,
- Vertical stability,
- Lateral stability,
- Channel pattern,
- River profile and bed features,
- Channel dimension relations, and
- Channel evolution.

This field assessment is followed by the evaluation of various channel dimension relationships.

Evaluation of the above characteristics leads to a determination of a channel's current state, potential for restoration, and appropriate restoration activities. A description of each characteristic is provided in the following sections.

7.1 Stream Channel Conditions

Stream channel conditions observed during initial field inspections included the follow characteristics:

- Riparian vegetation – concentration, composition, and rooting density;

- Sediment depositional patterns – mid-channel bars and other depositional features that indicate aggradation and can lead to negative geomorphic channel adjustments;
- Debris occurrence – presence or absence of woody debris;
- Meander patterns – general observations with regard to the type of adjustments a stream will make to reach equilibrium; and
- Altered states due to direct disturbance – channelization, berm construction, and floodplain alterations, etc.

These qualitative observations are useful in the assessment of channel stability. They provide a consistent method of documenting stream conditions that allows comparison across different sets of conditions. The observations also help explain the quantitative measurements described below.

7.2 Vertical Stability – Degradation/Aggradation

The bank height and entrenchment ratios are measured in the field to assess vertical stability. The bank height ratio is measured as the ratio of the lowest bank height divided by a maximum bankfull depth. Table A.1 shows the relationship between bank height ratio (BHR) and vertical stability developed by Rosgen (2001a).

Table A.1
Conversion of Bank Height Ratio (Degree of Incision) to Adjective Rankings of Stability (Rosgen, 2001b)

Adjective Stability Rating	Bank Height Ratio
Stable (low risk of degradation)	1.0 – 1.05
Moderately unstable	1.06 – 1.3
Unstable (high risk of degradation)	1.3 – 1.5
Highly unstable	> 1.5

The entrenchment ratio is measured as the width of the floodplain at twice the maximum bankfull depth. If the entrenchment ratio is less than 1.4 (+/- 0.2), the stream is considered entrenched (Rosgen, 1996).

7.3 Lateral Stability

The degree of lateral containment (confinement) and potential lateral erosion are assessed in the field by measuring the meander width ratio (MWR) and the Bank Erosion Hazard Index (BEHI) (Rosgen, 2001a). The MWR is the meander belt width divided by the bankfull channel width. This measurement provides insight into lateral channel adjustment processes, depending on stream type and degree of confinement. For example, an MWR of 3.0 often corresponds with a sinuosity of 1.2, which is the minimum value for a stream to be classified as meandering. If the MWR is less than 3.0, lateral adjustment is probable. BEHI ratings along with near bank shear stress estimates can be compared to data from monitored sites and used to estimate the annual lateral streambank erosion rate.

7.3.1 Bank Erosion Hazard Index (BEHI)

The numerical score on which the BEHI rating is based depends on the following:

- Bank Angle: The angle measured from the toe of the streambank slope against the dominant slope of the lower bank. If the bank slopes toward the hill slope it is less than 90 degrees; vertical banks have 90-degree slopes.

- Bank Height Ratio: The height of streambank as measured from the thalweg, divided by the bankfull height.
- Ratio of Root Depth to Bank Height: Measures the depth to which the bank is stabilized by root mass
- Root Density: Measures the percentage of the streambank that is stabilized by root mass.
- Surface Protection: Measures thee percentage of the streambank that is protected by surface vegetation, rocks, or other material that serves to armor the bank.

Once each of the five parameters is observed (bank angle, bank height ratio, rooting depth, root density, and surface protection) and assigned a value, a scoring table is used to determine the bank erosion potential for each parameter (scoring is based on original research by Rosgen and extrapolated from graphs into tabular form). Once each parameter has been assigned a score, the parameter scores are added together for a total score. The total score is then adjusted dependent upon the bank material composition. Final scores are assigned to the following categories: Very Low, Low, Moderate, High, Very High, and Extreme.

7.3.2 Near Bank Stress

Near Bank Stress (NBS) is a value extrapolated from the velocity gradients and shear stress in the near bank region. If the cross-sectional base flow channel is split into thirds, the near bank region is the closest one-third to the study bank. Studies measuring in-stream velocities show the strongest velocities occur within the thalweg region. Conversely, the weakest velocities are seen in the areas that are shallow and have a decreased bank angle or channel slope. This explains, in part, why deposition occurs on the point bar, and scour occurs against the apex of the meander bend where the thalweg is often located in close proximity to the toe of the streambank. This scour deepens the pool and may cause the channel to laterally migrate through bank erosion against the outside of the meander bend.

NBS values are can be assessed as Very Low, Low, Moderate, High, Very High, or Extreme (Table A.2). Values are estimated based on the shape of the near bank region along with the direction of flow. Typically, bar deposits have high or very high NBS values and pools have lower NBS values. NBS can be calculated through careful measurements of cross-sections and the development of bank profiles. Cross-sections should be performed on each study bank. First, the mean depth (dbkf = Abkf / Wbkf) is determined. Then, the bankfull width is divided into thirds (Wbkf / 3). Next, the maximum depth in the near bank region (dnb) is determined. Then, the maximum depth of the near bank region is divided by the mean depth (dnb/d). If the study bank is located along the outside of a meander bend, NBS can be determined by calculating the radius of curvature and dividing that by the bankfull width (Rc/Wbkf). If the study bank is located within a pool, two methods can be used. One involves dividing the slope of the pool by the average water surface slope (S_p/S) or by dividing the pool slope by the riffle slope immediately upstream of the pool (S_p/S_{rif}).

Table A.2
Ratings for NBS for Various Cross-Sectional Values (Rosgen, 2001a)

NBS Rating	Rc/Wbkf	S_p/S	S_p/S_{rif}	dnd/d
Very Low	>3.0	<0.2	<0.4	<1.0
Low	2.21-3.0	0.2-0.4	0.41-0.6	1.0-1.5
Moderate	2.01-2.2	0.41-0.6	0.61-0.8	1.51-1.8
High	1.81-2.0	0.61-0.8	0.81-1.0	1.81-2.5

NBS Rating	Rc/Wbkf	S_p/S	S_p/S_{rif}	dnd/d
Very High	1.5-1.8	0.81-1.0	1.01-1.2	2.51-3.0
Extreme	<1.5	>1.0	>1.2	>3.0

7.4 Channel Pattern

Channel pattern is assessed in the field by measuring the stream's plan features, including radius of curvature, meander wavelength, meander belt width, stream length, and valley length. Results are used to compute the meander width ratio (described above), ratio of radius of curvature to bankfull width, sinuosity, and meander wavelength ratio (meander wavelength divided by bankfull width). These dimensionless ratios are compared to reference reach data for the same valley and stream type to assess whether channel pattern has been impacted.

7.5 River Profile and Bed Features

A longitudinal profile is created by measuring and plotting elevations of the channel bed, water surface, bankfull, and low bank height. Profile points are surveyed at prescribed intervals and at significant breaks in slope, such as the head of a riffle or pool. This profile can be used to assess changes in river slope compared to valley slope, which affect sediment transport, stream competence, and the balance of energy; for example, the removal of large woody debris (LWD) may increase the step/pool spacing and result in excess energy and subsequent channel degradation. Facet (e.g., riffle, run, pool) slopes of each individual feature are important for stability assessment and design.

7.6 Channel Dimension Relations

The bankfull width/depth ratio provides an indication of departure from reference reach conditions and relates to channel instability. A greater width/depth ratio compared to reference conditions may indicate accelerated streambank erosion, excessive sediment deposition, stream flow changes, and alteration of channel shape (e.g., from channelization). A smaller width/depth ratio compared to reference conditions may indicate channel incision and downcutting. Both increases and decreases in width/depth ratio can indicate evolutionary shifts in stream type (i.e., transition of one stream type to another). Table A.3 shows the relationship between the degree of width/depth ratio increase and channel stability developed by Rosgen (2001a).

Table A.3
Conversion of Width/Depth Ratios to Adjective Ranking of Stability from Stability Conditions (Rosgen, 2001b)

Stability Rating	Ratio of Project to Reference Width/depth
Very stable	1.0
Stable	1.0 – 1.2
Moderately unstable	1.21 – 1.4
Unstable	> 1.4

While an increase in width/depth ratio is associated with channel widening, a decrease in width/depth ratio is associated with channel incision; hence, for incised channels, the ratio of channel width/depth ratio to reference reach width/depth ratio will be less than 1.0. The reduction in width/depth ratio indicates excess shear stress and movement of the channel toward an unstable condition.

7.7 Channel Evolution

Simon's Channel Evolution Model (introduced in Section 4.6) relies on a qualitative, visual assessment of the existing stream channel characteristics, such as bank height, evidence of degradation/aggradation, presence of bank slumping, and direction of bed and bank movement. Establishing the evolutionary stage of the channel helps ascertain whether the system is moving towards greater stability or instability. The model also provides a better understanding of the cause and effect of channel change. This information, combined with Rosgen's (1994) priority levels of restoration, aids in determining the restoration potential of unstable reaches.

8.0 HYDROLOGIC AND HYDRAULIC METHODOLOGY

Watershed hydrology answers the question, "how much water, in the form of runoff, is produced by different rainfall events?" Quantitative hydrology provides a discharge and a corresponding return interval, e.g., the 100-year discharge. Channel hydraulics characterizes the way a given discharge will function in the channel and floodplain. Quantitative measures of channel hydraulics include, velocity, shear stress, flood depth, etc. A variety of models are used to describe hydrology and hydraulic functions. Some models are better suited for small, steep gradient watersheds and others work better in low gradient, larger watersheds. A description of the approaches used for this project is provided below.

8.1 High Gradient Ephemeral/Intermittent Streams

Discharges for the potential impact reaches were calculated using the NRCS Graphical Method developed by the Natural Resources Conservation Service (NRCS) formerly known as the Soil Conservation Service (SCS). The Graphical Method was developed for calculating peak discharges for small watersheds and is considered appropriate for estimating discharges where gaged flow data are unavailable.

A single cross-section approach was selected for evaluating the channel hydraulics. A cross-section was selected to represent a reach within each potential impact stream. The selected reach is representative of a segment where field evidence of fluvial processes was noted, e.g. the presence of a step-pool or riffle-pool sequence. Discharge rating (stage-discharge) and shear stress rating (stage-shear stress) curves were developed for the selected cross-sections using the computer program WinXSPRO, A Channel Cross-Section Analyzer, Verion 3.0, developed by the U.S. Forest Service. WinXSPRO was developed for use in high gradient streams and uses a resistance equation approach.

Both the frequency (in years) of the discharge that resulted in a water depth to that of the bankfull indicator and that completely filled the channel was determined using the stage-discharge rating curve and discharge-frequency curve. Similarly, the shear stress rating curves were used to obtain bankfull shear stress. The bankfull shear stress was used to determine the particle size capable of being transported (Dcritical in mm) from the critical shear stress curve (Figure A.8). The Dcritical was compared to the particle size distribution curve of the sampled stream bed material to evaluate the potential for significant bed material entrainment. The stream bed material was sampled using the pebble count technique.

Adams and Spotila (2005) found that headwater streams do not display clear relationships between channel morphology, substrate, and drainage area. This differs from larger watersheds where fluvial processes are more prominent. In these small, steep gradient watersheds, the channel is more strongly influenced by the surrounding hillslopes and local boundary conditions, such as bedrock.

Due to the variability in channel morphology evaluating the hydraulics of steep mountain streams is very complex. Most of the methods developed are still confined to the realm of research. The following discussion pertains to the complexities associated with this type of analysis.

8.1.1 Flow Resistance Estimation

There is a lack of accurate methods for predicting flow resistance in steep mountain streams (Thorne and Zevenbergen, 1985). Conventional methods focus on grain resistance neglecting the effects of form (Papanicolaou et al., 2004). The limitations of these methods are quite significant in streams where the vertical protrusion of the largest particles is relatively large and sometimes exceeds the bankfull depth of flow (Papanicolaou et. al., 2004). The following conventional methods were examined for use: Thorne & Zevenbergen (1985), Jarrett (1984), Nelson et al. (1991), Limerinos (1970), Manning (1889), and Cowan (1956). It was concluded that the channel reaches being examined are far outside the limits of these methods. Therefore, a modified Manning's roughness value was used to characterize the flow resistance based on Cowan's method. This yielded roughness values that were fairly consistent with Jarrett's Method (1984).

8.1.2 Critical Stress Estimation

Quantifying the critical stress of sediment particles in mountain streams poses an extra degree of difficulty. The incipient motion of sediment is affected by surface waves and the entrained air bubbles that are generated as the flow plunges to the protruding roughness elements (Papanicolaou et. al., 2004). These complex flow aspects were not considered in this analysis. Steady flow conditions were assumed to be valid for computing shear stress values. Competency was assessed by plotting grain diameter (mm) versus critical shear stress (lbs/sqft) on a graph developed by Leopold et al. (1964) and Rosgen and Silvey (2005) as adopted by the USEPA (2005). For this analysis, the Leopold curve was used because it represents data from streams with rounded bed material as opposed to irregular shaped glacial till. However, these relationships may not be representative of steep mountain streams, such as the potential impact reaches.

8.1.3 Energy Slope Estimation

The energy slope was estimated to be equal to the local bed slope for low flows. For high flows, the energy slope was assumed to be equal to the average bed slope.

8.1.4 Bankfull Stage Estimation

Field observed bankfull indicators were identified and surveyed as part of a cross-section taken at stable riffles and pools. The relevance of these indicators in the application in regards to small, steep mountain streams is still unknown. Some of the study reaches have extremely small drainage areas and likely did not have channels prior to European settlement and land clearing. When the forests were removed, peak runoff likely increased, creating rills and gullies. With reforestation, and the presence of bedrock and colluvium, the channels have stabilized. Since large storms may have created these channels, the return interval at the top of bank or bankfull is much higher than bankfull indicators in perennial streams that must transport the sediment that is delivered by the watershed.

8.2 Lower Gradient Intermittent/Perennial Streams

HEC-RAS was used to model channel hydraulics in the lower gradient intermittent/perennial stream reaches. HEC-RAS, produced by the USACE, is designed to perform one-dimensional hydraulic calculations for a full network of natural and constructed channels. The following is a description of the major capabilities of HEC-RAS.

The unsteady flow component of the HEC-RAS modeling system is capable of simulating one-dimensional unsteady flow through a full network of open channels. The unsteady flow component was developed primarily for subcritical flow regime calculations. However, with the release of Version 3.1, the model can now performed mixed flow regime (subcritical, supercritical, hydraulic jumps, and draw downs) calculations in the unsteady flow computations module.

This component of the HEC-RAS modeling system is intended for the simulation of one-dimensional sediment transport/movable boundary calculations resulting from scour and deposition over moderate time periods (typically years, although applications to single flood events are possible).

The sediment transport potential is computed by grain size fraction, thereby allowing the simulation of hydraulic sorting and armoring. The model has the ability to model a full network of streams along with the use of several different equations for the computation of sediment transport.

The sediment transport competency can also be calculated by using the calculated shear stress (lbs/ft^2) at a particular discharge (or profile) from the HEC-RAS Model and plotting that against the particle size (mm) from the table adopted by the USEPA (2005). As explained in Section 8.1.2, this will give the particle size (mm) that motion can be initiated for a given cross-section and flow conditions.

9.0 BIOTIC ASSESSMENT METHODOLOGY

Physical habitat surveys allow investigators to document the relative quality and quantity of habitat available for both aquatic and terrestrial organisms. For instance, physical habitat has been correlated to the prediction of fish in a stream reach (Gorman and Karr 1978, Binns and Eiserman 1979, Schlosser 1982, Fausch et al. 1988, Lyons 1991). A wide variety of methodologies and procedures is available to sample physical habitat and stream conditions (Armantrout, 1982; Oswood and Barbar, 1982; Van Deventer and Platts 1983; Simonson et al., 1994).

After reviewing the literature cited above, the Simonson et al. (1994) methodology was selected for this project because it is an efficient, flexible accurate and precise system that can be applied rapidly and easily suited for different environmental conditions. The method, founded on principles of fluvial geomorphology and stream fish communities, maintains a basic structure that can facilitate comparisons among streams and studies.

Simonson et al. (1994) states that the optimal number of transects required for assessment varies with stream width. Approximately 13 transects, spaced every three mean stream widths (MSW) are appropriate for narrow streams, less than 16 feet wide. In wider streams, between 16 and 115 feet wide, approximately 20 transects are used, which are spaced every two MSWs apart. Due to the size of the streams in this project, 13 transects were used at both the impact and mitigation sites. The length of stream sampled is a function of stream width, but the sample size or number of transects is always the same because transect spacing is always either two or three MSWs apart depending on the size of the stream.

For this project, the proposed impact and mitigation streams were all determined to be “narrow” according to Simonson et al. (1994), resulting in 13 sampled transect spaced every 3 MSWs apart. Transects were sampled in representative reaches throughout the the study area. A transect began at the upslope side of the riparian zone on the left bank and extended across the stream to the upslope side of the riparian zone on the right bank. Simonson et al. (1994) defines the riparian zone on one bank as having a width of 25 feet.

Biological surveys of fish and benthic marcoinvertebrates followed the USEPA’s RBP method (Barbour et al., 1999). This method is widely used, applicable to all wadeable streams and rivers, and is

recommended by many regulators (USEPA, 2000). It is a rapid and cost efficient protocol adapted by many state agencies.

9.1 Stream Habitat

Habitat assessments for this project were developed using the USEPA's RBP method (Barbour et al., 1999). This method allows for a visual-based habitat assessment that precludes the need for multiple biological evaluations. The assessment focuses on the following habitat features: in-stream habitat, channel morphology, bank structural features, and riparian vegetation. A total of ten parameters are rated as optimal, suboptimal, marginal, or poor based on criteria included in a Habitat Assessment Field Data Sheet to obtain a total habitat assessment value (HAV).

To more accurately describe each of the parameters in the protocol, quantitative measurements to evaluate riparian vegetation, LWD, bank erosion, and geomorphology were developed to support observations collected using the USEPA habitat assessment method.

There are studies documenting the relationships between habitat variables and the abundance of biota. The RBP method uses these relationships to assess habitat as a surrogate for biotic function, and builds on protocols used since the 1980s (most directly from the Wisconsin Methods of Evaluating Stream, Riparian, and Biotic Conditions; Wang and Kanehl, 2002). The approach used in other countries, including Great Britain, is similar to this visual-based approach (Barbour et al., 1999).

The USEPA RBP method has two basic approaches, one for high-gradient streams and another for low-gradient streams. High gradient streams are prevalent in the permit area. Substrates in these streams tend to be coarse particulates. In lower gradient streams, which include approximately 60 percent of the mitigation reaches, fine particulates are more common.

The USEPA RBP method requires analysis of either 100 meters of stream length or 40 times the streams wetted width. Visual and biological assessments should not be separated in distance. Teams of two assessors are encouraged so that a consensus can be reached for each stream. The following parameters were evaluated for high-gradient streams:

- Epifaunal Substrate/Available Cover: Evaluates the relative quantity and variety of natural structures in the stream such as cobbles (riffles), large rocks, LWD, and undercut banks. Greater than 70 percent is rated as optimal, less than 20 percent is considered to be poor.
- Embeddedness: Describes the extent to which rocks and other material in the stream are covered or sunken into the silt, mud or sand of the stream bottom. Less than 25 percent embeddedness is considered to be optimal; greater than 75 percent is considered to be poor.
- Velocity/Depth Combinations: An optimal habitat would have areas of slow, deep water; fast, deep water; slow, shallow water; and fast, shallow water. Streams rated optimal have all four varieties, those rated as poor are dominated by one.
- Sediment Deposition: The presence of point bars or islands tends to indicate less stable streambank conditions and lower water quality. Less than five percent of the streambed covered with sediment is considered to be optimal, greater than 50 percent is considered to be poor.
- Channel Flow Status: Describes the degree to which the stream fills the available channel. Generally speaking, the higher the percentage of the stream channel that is filled by water, the higher the water quality; greater than 75 percent is considered optimal, less than 25 percent indicates poor conditions.

- Channel Alteration: Evaluates the stream for channelization or dredging versus a natural stream channel. An absence of channelization is considered to be optimal, greater than 80 percent altered is considered to be poor.
- Frequency of Riffles (or Bends): Measures the sequence of riffles by dividing the ratio between the riffles by the width of the stream. Ratios less than 7:1 are indicative of optimal conditions, ratios less than 25:1 indicate poor conditions.
- Bank Stability: Determines the percentage of assessed streambank that have been eroded. Less than five percent is considered optimal, over 60 percent is considered poor.
- Bank Vegetative Protection: Estimates the amount of protection that area vegetation affords in the near-stream portion of the riparian zone. If more than 90 percent of the streambank surface is covered by vegetation, the stream is rated as optimal, if less than 50 percent is covered, it is rated as poor.
- Riparian Vegetation Zone Width: Measures the width of the riparian zone. If over 60 feet, the riparian buffer is considered to be in optimal condition. If less than 20 feet, it is considered to be poor.

Low gradient streams were not identified in the permit area, however there are low gradient mitigation sites identified both on- and off-site. Under the USEPA RBP method, embeddedness, velocity depth combinations, and the frequency of riffles (bends) are not assessed and the following parameters are substituted:

- Pool Substrate Characterization: Evaluates the type and condition of the bottom sediments found in pools. Optimal conditions are characterized by a mixture of substrate materials with root mats and submerged vegetation common. If the pool has a clay or bedrock substrate with no vegetation, the stream is assessed as poor.
- Pool Variability: There are four basic types of pools, large shallow; large deep; small shallow; and small deep. Streams rated optimal have all four varieties, those rated as poor are dominated by small shallow pools or lack pools.
- Channel Sinuosity: A high degree of sinuosity provides a diverse habitat and allows streams to more easily handle surges associated with flooding. Higher sinuosity is characteristic of optimal conditions.

9.2 Riparian Vegetation and Large Woody Debris

Streamside vegetation and woody debris are important components of stream systems, especially in the Appalachian Mountains. They filter contaminants, reduce surface flow velocities, normalize releases into streambanks, shade streams and create a thermal buffer along the stream corridor, provide high quality terrestrial habitat, and supply streams with the nutrients and organic matter necessary for aquatic life. The following sections describe the assessment methods used for riparian vegetation and woody debris for this project.

9.2.1 Riparian Vegetation

Assessments of the quality of vegetation in the surrounding riparian zones typically look at either the plant assemblage or the soil and physical conditions of the riparian zone. For most purposes, a general vegetation characterization such as that described in Mills and Stevenson (1999) is sufficient. The method is relatively straightforward in the field, requiring only survey forms, a telescoping rod, tape measures, stakes, and flagging. Three procedures described by Mills and Stevenson (1999) to characterize and quantify streamside vegetation were utilized. They were:

- Riparian Classification
- Vegetation Cover by Height
- Cover by Vegetation Layer

9.2.1.1 Riparian Classification

To first classify the riparian vegetation, the overall habitat was identified as being one of the following:

- Hydroriparian wetlands: hydric soils or substrates that are rarely or only briefly dry. Vegetation is predominantly obligate and preferential wet riparian plants.
- Mesoriparian areas: nonhydric soils and substrates that are dry seasonally. Vegetation is a mixture of obligate, preferential, and facultative riparian plants.
- Xeroriparian habitats: mesic to xeric; the average moisture is higher than the surrounding uplands due to occasional (less than once a month per year) surface wetting or increased groundwater from the associated water body. Vegetation is preferential, facultative, and non riparian plants.

9.2.1.2 Vegetation Cover by Height

Vegetation cover by height was quantified using the telescoping rod, measuring and identifying vegetation at twenty points along each transect of each bank. The sampling points were consistently spaced along each transect to allow for a total of 100 sampling points on each sampled reach.

At each survey point, the telescoping survey rod was used to assess vegetation cover by height, which included measuring herbaceous plant height (no more than 5 feet), shrub height (20 feet) and tree height (top of canopy if possible). If the telescoping rod was contacted by vegetation at or below 5 feet, the survey point was assigned an "H," if the rod was contacted between 5 and 20 feet, the point was assigned an "S" and if it was contacted above 20 feet the point was assigned a "T." It is possible for a given sampling point to have all or none of the letters assigned. When the 100 points are collected, the number of total H, S, and T readings were calculated as the percentage of that type of cover recorded for the site.

9.2.1.3 Cover by Vegetation Layer

A spherical densiometer was used to quantify cover by vegetation layer to measure the extent of cover from tree, shrubs, and herbaceous plant layers. This methodology typically provides an overall estimate of canopy cover.

A spherical densiometer contains a mirror with a series of squares delineated on its surface. Each corner of each square can be used as a discrete sampling point. The densiometer has a bubble level that the user utilizes to ensure that the device is parallel with the land surface. To estimate the canopy, the device is held about one foot above the land and water surface and leveled. A total of 17 sampling points arranged in a "V" pointing away from the user are evaluated. Readings were taken on the right bank in the middle of the transect, in the center of the stream, and on the left bank in the middle of the transect. At each of the three locations, a reading was taken in each of four directions, north, west, south, and east. Sampling points touching herbaceous, shrub, or tree canopy were assigned to the appropriate cover group. The total number of sampling points counted that are covered by the vegetation layer were divided by the total number of sampling points counted and multiplied by 100 to provide a percent cover for that layer.

In addition to the methods outlined above, diameter at breast height (dbh) was also measured along each of the sampled transects. All trees with a dbh greater than six inches were counted and identified to the lowest practical taxon. This information provides an estimated age of the forest and provides a detailed species list and estimated count of trees in a sampled reach.

9.2.1.4 Vegetation Plot Monitoring

Vegetation monitoring is required to evaluate the success of the vegetation components of the project. Vegetation survivability is evaluated by using a five-year monitoring plan to assess interim measurements of the project's proposed success criteria. The number of quadrants required will be based on the species/area curve method, with a minimum of three quadrants. The size of individual quadrants will be 100 square meters for woody tree species, 25 square meters for shrubs, and one square meter for herbaceous vegetation. Vegetation monitoring plots are randomly located to represent the different zones within the project area, as directed by the CVS-EEP 2006 Protocol for Recording Vegetation (Lee et al.; 2006). Measurements recorded should unbiased, objective, and reproducible. Each plot location will be recorded using either latitude/longitude or UTM coordinates. First year Vegetation Monitoring Data will be collected during the month of September. Data for the second and all subsequent years will be collected between June 1 and September 31.

For plot construction, each plot will be marked with twelve-inch or greater sections of half-inch diameter galvanized steel conduit driven in the ground, with four to six inches exposed. If necessary, larger metal conduit stakes may be used. Each stake must be discreetly marked with flagging. The species of each planted stem is recorded, along with its X and Y coordinates relative to the plot origin. To reduce the ambiguity associated with application of scientific names, the taxonomic standard used to identify the species will be provided. A source code is used to identify the origin of the stem (C for Cultivated, T for Transplanted from elsewhere within the project boundary, and L for Live stake). For baseline monitoring where the source of cultivated material is obvious, this source should be further specified (B for Ball and burlap, P for Pot, and R for bare Root).

The following dimension measurements will be recorded for planted woody stems:

- For those that are less than 1.37 meters in height – the height (cm) of the longest stem and the Diameter at one Decimeter Height (ddh) above the ground surface in millimeters of the thickest stem.
- For those that are between 1.37 and 2.5 meters in height – height, ddh, and dbh in centimeters at a height of 1.37 meters above the ground.

Live stakes follow the above measurement protocol; however, ddh is not recorded.

A ***vigor*** code will be recorded for each plant using the following scale:

4 = Excellent
3 = good
2 = weak
1 = unlikely to survive one year
0 = dead
M = missing

A damage comment may be included for plants with a vigor of four or three, and is required for any plants with a vigor less than three. The 2006 CVS-EEP recommended list of damage categories is used (Lee et al.; 2006).

The following dimension measurements will be recorded for natural stems to assess the overall recovery and compositional of the plot. A total number of stems in each size class (height and dbh classes) will be recorded for each species found. Stems that are less than 10 cm in height are not recorded. Stems will be recorded in height classes: 10-50 cm, 50-100 cm, and 100-137 cm. All stems at least 1.37 m in height (breast height) are assigned to DBH classes. The dbh classes are (in centimeters): 0-1, 1-2.5, 2.5-5, 5-10, 10-15, 15-20, 20-25, 25-30, 30-35, and 35-40. Any stem equal to or greater than 40 cm dbh is recorded individually by diameter and rounded to the whole centimeter.

At least one photograph is required for each plot and is generally taken from the plot origin toward the diagonally opposite corner. It is desirable to take photographs before tape measures have been removed from the plot as these serve to clarify the portion of the photograph relative to the plot. Any photo identification will be recorded on the plot datasheet, in addition to the location and direction of the photos.

9.2.2 Large Woody Debris

Large woody debris (LWD) is defined as organic matter more than 3 feet in length that is at least 4 inches in diameter (Davis et al.; 2001). While absent in many environments, LWD is a vital component of riparian ecosystem in the Appalachian Mountains. It slows stream flow, allows organic material to settle out of the suspended load, provides protection and habitat for biota, and shields streambanks. The LWD method applied was developed by the United States Forest Service (USFS) (Davis et al. 2001). This method counts all of the woody debris and debris dams within the bankfull channel.

In addition to counting all of the LWD associated with the bankfull channel, the USFS method also requires the following LWD observations:

- Ratio of LWD length with the bankfull width of the stream at that location,
- Diameter of LWD,
- Location within the riparian zone,
- Structure (function of the assessed LWD: bridge, dam, ramp, submersed, buried),
- Stability (secured, buried, or intermediate), and
- Orientation with respect to stream flow.

For debris dams, the following observations are recorded:

- Length of the debris dam (as a percentage of the bankfull width),
- Height of the debris dam (as a percentage of the bankfull width),
- Structure (grain size of the debris: coarse, intermediate, fine),
- Location (in high flow channel, in low flow channel, etc.), and
- Stability (movable, intermediate, secured).

Observations were scored on a scale of one to five, with five being associated with LWD having the greatest impact on a steam (e.g., blocking a channel, highly stable). Once these observations were recorded, it is possible to obtain the large woody debris index (LWDI). The LWDI is determined by tabulating scores for woody debris (total piece score, PS) and debris dam score (DDS). The PS is determined by counting the pieces of woody debris assigned to each score and multiplying by the score. For example, if there are 3 pieces of LWD assigned a score of 1, 10 pieces assigned a score of 3, and 5 assigned a score of 5, the PS for that reach

would be (3 x 1) + (10 x 3) + (5 x 5) for a total of 58. The DDS is determined in the same manner as the PS; however, the DDS score is multiplied by five to reflect the changes debris dams cause to riparian ecosystems. For example, if there were three debris dams on a reach, one assessed a value of three and two assigned a value of 5, the DDS would be 5 x [(3 x 1) + (2 x 5)] for a total of 65. The LWDI for this reach would be 58 + 65 = 123.

9.3 Aquatic Life

According to SMCRA, ephemeral channels only carry water infrequently for short time periods and therefore, do not support aquatic populations and biologically, function as terrestrial habitat. Thus, aquatic communities were only sampled within the intermittent and perennial sections of channel, at the proposed impact and mitigation streams. In accordance with the Interim Chemical/Biological Monitoring Protocol for Coal Mining Applications (WVDEP, 2000), benthic resources are recommended to be collected during the monitoring period before permits have been issued and were, therefore, sampled at selected stations by Baker (Baker, 2007). Benthic macroinvertebrates are a primary food source not only for fish and salamanders, but for riparian birds and other animals which forage on both aquatic and terrestrial stages of aquatic insectsand which can be essential to their survival (McCafferty, 1981). Thus, benthic macroinvertebrate surveys were conducted at the proposed impact and mitigation streams in conjunction with other biological surveys to serve as baseline data and to be continued during the monitoring period.

9.4 Fish

Assessing the fisheries resource in a stream provides an integral component to understanding the functioning of the biological community, to adequately evaluate biological integrity, and to protect surface water resource quality (Barbour et al., 1999). Fish are good indicators of long-term environmental conditions of a stream and its watershed, due to being relatively long-lived, mobile, and generally thriving in perennial systems. One of the goals of this plan is to improve and diversify overall fisheries habitat, which includes creating riffle, run, pool, and glide habitats. Each of these habitat types supports different life cycles and different species of aquatic organisms (Rohde et al. 1994). With the proper methods and time, this habitat improvement is expected to increase numbers of fish, increase total biomass, and improve species composition.

Fisheries resources were sampled using the multi-habitat approach outlined in the USEPA's RBP method (Barbour et al. 1999). A single pass, fixed-distance designation was used to collect a representative sample of the fish assemblage in the sampled reach. Block nets were used as barriers at the upstream end of the sampled reaches. Electrofishing was conducted with a 3-person team and preceded in the upstream direction using a side-to-side sweeping technique.

Fish were held in live wells using standard battery operated aerators until subsequent identification and enumeration was completed. All fish (> 20 mm total length) were collected, observed for deformities, and identified to the species level. Specimens that could not be identified in the field were preserved in ten percent formalin solution and stored in labeled containers for identification in the lab. A subsample of each species was also preserved to verify field identifications. The remaining individuals were released on site.

Species richness or total number of species was calculated. This number decreases with increased degradation. However, it is important to remember that number of species is strongly correlated with stream size (Karr et al., 1986; Ohio EPA, 1987). Number of individuals or abundance per species was also calculated. Total biomass or total weight of each species was also measured in the field and density per acre was calculated in the laboratory. Fish length and weight ranges were recorded per species. Tolerance classifications were assigned for selected species using EPA's (Barbour et al. 1999) Index of Biotic Integrity Designation for Fishes of the United States.

For the purposes of this study, Simpson's Diversity Index (Simpson, 1949) was selected because the sampling methodology selected for this study satisfied the assumptions of the index. Like most diversity indices, it combines two quantifiable measures, richness and evenness. Richness refers to the number of taxon found in a community, and evenness refers to the relative abundance of each taxon. For example, a community has high diversity if many nearly equally abundant taxon are present. Conversely, a community that has a few taxon or if a few taxon are very abundant, then diversity is low. Simpson's Diversity Index was calculated with Krebs/WIN software (Krebs, 1998). The Simpson's Diversity Index ranges from 0 to 1 with 1 being the most diverse.

9.5 Benthic Macroinvertebrates

Many benthic macroinvertebrates are sensitive to changes in organic pollutants, sediments, and toxicants, and therefore, are widely used as a monitoring tool by many state water resource agencies (Southerland and Stribling 1995, EPA 2002). Unlike fish, benthic macroinvertebrates are not as mobile, and therefore, are more prone to reflect direct or short-term changes in water quality or habitat (Kuehne, 1962; Bartsch and Ingram, 1966; Wilhm and Dorris, 1968; Warren, 1971; Cairns and Pratt 1993). Their long life cycles allow conclusions to be made about the stream and watershed in regards to environmental quality. Measurements of richness and diversity relative to the chemical and physical characteristics of their environment provide very useful indices for baseline and monitoring studies (McCafferty, 1981). Merritt and Cummins (1996) provides an outstanding list of reference resources to identify organisms, identify specific life histories, ecological treatments, and list excellent comments in regards to a particular benthic macroinvertebrate's importance to humans in regards to recreational fly fishing.

Benthic macroinvertebrates were sampled using USEPA's RBP method (Barbour et al. 1999). For purposes of mitigation monitoring, a multi-habitat approach was used to demonstrate the importance of habitat diversity for benthic macroinvertebrates. Monitoring of existing streams typically results in a general lack of in-stream habitats, compared to the same streams after improvements, where in-stream habitat diversity has increased dramatically. By using a multi-habitat approach, the benthic macroinvertebrate data can demonstrate this change in available habitat.

A multi-habitat approach is conducted by collecting a composite sample of 20 jabs or kicks using a rectangular dip net (0.5 m x 0.3 m). Major habitat types (cobble in riffles and runs, snags in pools, vegetated banks, submerged macrophytes, and sand) were sampled in a proportional representation within a 100 meter sampled reach (approximately 3.1 square meters of habitat). For example, if the sampling reach was comprised of 50 percent snags and 50 percent riffles, then 50 percent of the jabs/kicks (10) would be in snags and 50 percent of the jabs/kicks (10) would be in riffles. Sampling began at the downstream end of the reach and proceeded upstream. The composite sample was washed through with on-site water, while large rocks and LWD were discarded. The sample was transferred to a one-liter container and preserved with 95 percent ethanol.

All collected organisms were sorted and identified to family level. Identification followed Merritt and Cummins (1996) for larval insects and Pennak (1989) for crustaceans and annelids. Data analysis included calculation of RBP metrics: total taxa; Ephemeroptera/Plecoptera/Trichoptera (EPT) taxa; percent EPT; percent Chironomidae, percent two dominant taxa; and Hilsenhoff Biotic Index (HBI; Table A.1). West Virginia Stream Condition Index (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 and were assigned a rank (Table A.2). The Simpson's Diversity Index, as described in Section 2.9.4, was also calculated for benthic macroinvertebrates.

Table A.1
Hilsenhoff Biotic Index (HBI) Ranges (Mandaville, 2002)

Biotic Index	Water Quality	Degree of Organic Pollution
0.00 – 3.50	Excellent	No apparent organic pollution
3.51 – 4.50	Very Good	Possible slight organic pollution
4.51 – 5.50	Good	Some organic pollution
5.51 – 6.50	Fair	Fairly significant organic pollution
6.51 – 7.50	Fairly Poor	Significant organic pollution
7.51 – 8.50	Poor	Very significant organic pollution
8.51 – 10.00	Very Poor	Severe organic pollution

Table A.2
WVSCI Ranges (Gerritsen et al., 2000; WVDEP)

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

9.6 Water Quality

Design considerations for the improvement of water quality in the restoration reaches focuses on increased aeration, shading, and the addition of organic matter. These functional lifts are a result of a natural channel design which addresses stream dimension, pattern, and profile, placement of rock and wood in-stream structures, and planting of riparian vegetation. In addition to providing functional lifts, the design will make alterations that reduce sediment both from upland and in-stream sources and enhance stream bank stability.

Water quality monitoring of impaired streams and the quantification of improvements through restoration requires substantial amounts of data collected over many years, both before and after restoration. Therefore, developing design criteria from site specific water quality monitoring is not practical. Instead, a thorough review of the literature was used as a guide to create a natural channel design that will ultimately improve water quality. The following discussion provides background information on the likely functional improvements associated with the natural channel design.

9.6.1 Dissolved Oxygen (DO)

Oxygen enters the water column of lakes, rivers and streams by at least two primary paths: by the production of aquatic autotrophs and by diffusion at the air-water interface. The autotrophic supply of oxygen is usually minimal in the small rivers and streams on which most stream restoration projects are done. A lotic or flowing water system primarily obtains oxygen at its surface and as the surface is agitated by water falling down slope. Any structure within the channel which breaks the water surface and causes increased velocity and turbulence will cause oxygen that is in the air to diffuse into the water. This water borne oxygen is referred to as dissolved oxygen (DO). Turbulence increases the diffusion of oxygen into the water column

up to the point where the water column is saturated or in equilibrium with that in the air. Under significant turbulence the water column can become super-saturated but this is usually short lived as oxygen diffuses back into the atmosphere.

Stream restoration designs usually incorporate various types of structures for the variety of benefits they can provide. These benefits include bank stabilization, grade control, channel narrowing, and habitat creation. Most of these structures also provide the added benefit of increasing oxygenation of the stream. For example, "random" boulder clusters or structures that are created from clusters of boulders cause turbulence of flow resulting in eddies or vortices downstream of the boulder (Fischenich and Seal, 1999). This turbulent flow pattern causes a greater interface surface area of air and water, and oxygen levels can increase to equilibrium. Because all stream restoration structures that extend above the water surface cause this type action they contribute to increasing the oxygen supply of the stream.

Aquatic species have adapted to the specific environments in which they are found. Part of adapting to an environment is evolving the ability to extract needed oxygen from that environment. Fish species have adapted to a range of environmental oxygen availabilities. Trout and salmon require oxygen concentrations that are at or slightly below saturation, while other fish families like catfish, sunfish and some minnows have adapted to survive in waters with an oxygen concentration below 50 percent of saturation (Calhoun, 1966; Moss and Scott, 1961). This is accomplished by having differing types of hemoglobin that varies in its affinity for oxygen (Moyle and Cech, 1982).

The ability of fish to function normally depends on their environment's supplying the levels of DO to which they are adapted. Due to their importance in major fisheries, salmonids have been intensively studied and this data illustrates the importance of DO to fish. The swimming performance of migrating salmon drops as DO drops below air-saturation levels (Bjornn and Reiser, 1991). Areas of low DO will also be avoided by migrating salmon. Hallock et al. (1970) observed that adult salmon ceased to migrate as DO fell below 4.5 mg/L and did not resume until DO was greater than 5 mg/L. Minimum DO for spawning salmon was found to be 80 percent of saturation and not less than 5 mg/L.

The behavior of warm-water fish species is also affected at certain critical DO levels. Dahlberg (1968) showed that largemouth bass, *Micropterus salmoides*, had a greatly reduced swimming speed at oxygen concentrations below 6 mg/L. Nine species of aquatic insects were studied to see what their tolerance for low DO levels would be (Nebeker, 1972). As in fish, a wide range of acceptable DO levels was found. One species of midge could survive DO concentrations down to 0.6 mg/L, while a mayfly could only survive conditions slightly below saturation at 18.5 C. Like fish, aquatic insects have adapted to a specific range of DO.

Structures used in stream restoration usually cause an increase in DO concentrations as they increase turbulent flow toward the center of the channel. Structures that concentrate flow to a central area or point will cause scour on the stream bottom and sorting of bed material. This action results in well-oxygenated deep water habitat and a glide out of the pool with well sorted gravels that contain very little fine material. The increased water velocity coming out of the scour hole will cause a good flow of well oxygenated water through the gravel. This is the type of habitat that many stream fishes will choose for spawning. Stream restoration structures result in turbulent flows directed toward the center of the channel, which improves physical habitat and increases the level of dissolved oxygen in the water column.

9.6.2 Temperature

Water temperature is a primary factor determining the fish population inhabiting a stream. Brett (1971) considered temperature to be the master abiotic variable for fishes. Fishery

managers have long recognized the importance of temperature to fish distribution and have separated lotic systems into warm-water streams and cold-water streams. Warm-water streams are those where temperatures exceed 24°C to 26°C for extended periods of time and cold-water streams are those that rarely exceed this temperature range (Moyle and Cech, 1982). Trout and sculpin would normally be expected in the cold-water, higher elevation, 1st to 3rd order reaches. As the stream increases in order, the diversity of fish and other aquatic organisms increases; it becomes a cool and then warm-water system; and a typical fish community would be composed of sunfish, catfish, and minnows (Vannote, 1980).

While not presented above in the discussion of DO, temperature is a primary variable in determining how much oxygen will diffuse into the water column. Oxygen concentration decreases with increasing temperature (Wetzel, 1983). Activities that impact the riparian vegetation along a stream and cause a warming of the stream also cause a decrease in the oxygen carrying capacity of the stream.

Because fish are cold-blooded they are generally the same temperature as the water in which they are found. Unsuitable temperatures can cause disease outbreaks, can alter normal migration and spawning behavior and can accelerate or retard maturation (Bjornn and Reiser 1991). Salmonids, which require low water temperatures, primarily have suitable habitat defined by the limiting factor of stream temperature. (Magnuson et al., 1979). Salmonids have been found to delay their upstream migration when natal streams were too warm (Monan 1975). Understanding the range of temperatures that fish species can survive has been a major area of study since the 1800s. Beitinger et al. (2000) conducted an extensive review of the literature on temperature tolerance in fishes. While much of the research on how stream temperature affects resident organisms has been directed to fish, all aquatic organisms depend on the proper stream temperature to maintain their life cycles and metabolism. An example of how dependent other aquatic species are on specific temperatures can be seen in a study of sixty-one macrobenthic species. They had a reduced body size at a given developmental stage when reared at water temperatures that were higher than normal but not at a level high enough to cause obvious stress (Atkinson, 1995).

Stream temperature can be altered by a number of causative agents. Most often stream restoration projects are successful at improving altered temperature regimes of streams that have had their riparian vegetation removed or greatly reduced. Diverse riparian vegetation is planted to reestablish a native riparian plant community and the area is protected from future impacts. In time the riparian vegetation will shade the stream and limit heating of the water. The vegetated riparian buffer will also reduce rapid cooling at night by insulating the channel area. Clemmons (2000) found that when recording thermometers were set approximately 25 feet apart, one in the shade in an open field and the other inside a well vegetated riparian zone, that air temperature differences due to the riparian vegetation where significant. Air temperature during the hottest part of the day averaged 3.7°C hotter in the field over a 7 day period. On one sunny day the field air temperature was 5.4°C hotter and had a 24-hour minimum to maximum range of 15.3°C. At night the buffer did not get as cool and averaged 0.4°C warmer. Trees that provided shade to several headwater streams in Oregon were killed by forest fire, reducing shade from a pre-fire coverage of greater than 90 percent to a post-fire coverage of 30 percent. This resulted in water temperature increases that ranged from 3.3°C to 10.0°C (Amaranthus et al., 1989). These data show the importance of riparian vegetation for maintaining cool stream water temperatures.

Riparian vegetation also plays an important role in regulating soil moisture, temperature and soil loss due to freeze-thaw cycles (Wynn and Mostaghimi, 2006). Trees provide the best protection against erosion of soils that are susceptible to desiccation, and herbaceous vegetation better protects silty soils that are prone to erosion due to the freeze-thaw cycle. Riparian

improvements through cattle exclusion, stream bank sloping and structural bank protection were shown to reduce water temperatures on a Wisconsin stream to the point that brown trout began spawning. However, in watersheds where only limited riparian work was done there was no improvement to water temperatures (Wang and Kanehl, 2002). A comparison between streams that had their riparian zones protected by exclusionary fencing 10 to 20 years prior to the study and streams that had not been protected demonstrated the benefits of riparian vegetation. Late summer water temperatures within the enclosure areas were cooler and within acceptable range for resident trout, while areas not protected had temperatures that were potentially detrimental. Exclosure areas also had a more stable stream morphology and greater quantities of LWD (Opperman and Merenlender 2004).

Stream restoration plans should include planting and protection of stream riparian areas. This will provide the shade that protects the thermal regime of the stream. Structures that are installed also enhance habitat and help maintain cool water by creating deep pools and overhead cover. Mesick (1995) found that after stream restoration, brown trout survival and growth were positively correlated with the amount of pool habitat, water depth, and streambed complexity particularly when summer water temperatures were high.

9.6.3 Organic Matter

Energy is made available to stream organisms through two primary sources: either photosynthesis by aquatic plants (autochthonous sources) or decomposition of organic material deposited in the stream (allochthonous sources) (Murphy and Meehan, 1991). In small 1st to 3rd order streams the primary source of energy is an allochthonous source. Fisher and Likens (1973) found that organic material from the adjacent forest provided 98 percent of the organic matter of Bear Brook in New Hampshire. Deciduous trees provide the greatest input of organic matter to streams. The total biomass of trees is several orders of magnitude greater than herbaceous or shrub stands; however, the foliar biomass of trees is 5 to 20 times greater (Gregory et al., 1991). Conifers have a greater foliar biomass but since they lose only a fraction of that in a year it does not contribute the biomass that deciduous trees do and on a seasonal pattern. There is a shift from allochthonous to autochthonous production and an accompanying shift in the organisms that exploit those energy sources as a stream moves higher in order and lower in elevation. (Vannote, 1980).

Stream restoration projects and the structures that are installed during those projects, improve the long-term ability of the stream riparian zone to create organic matter and for the streams aquatic organisms to utilize it. This is accomplished by reestablishing a diverse riparian plant community that will provide leaf litter and woody debris. Structural improvements enhance the streams ability to retain the organic material within the stream so that micro and macrobenthic organisms can break it down and use the liberated energy for growth. Structures such as root wads provide complex root systems installed below the water surface which function to capture organic material (Sylte and Fischenich, 2000). The high surface area of a root wad also provides benthic organisms extensive colonizing space on which they can process the organic material. Vane type structures slow the water down along the bank causing a depositional area where organic material accumulates and can be utilized by organisms.

Muotka and Laasonen (2002) examined the ability of restored streams in Finland to retain leaf litter as compared to unrestored streams. They found that restoration increased substrate heterogeneity and that retention efficiency was higher than in the control channelized streams. Retention was not as good as in natural streams which had greater densities of moss that enhanced retention. Lepori et al. (2005) compared channelized streams that were restored using boulders and woody debris with unrestored channelized streams and unimpacted reference stream sites. They found that coarse particulate organic matter retentiveness was

most closely related to the density of boulders and submerged woody debris. Restored reaches were on average twice as retentive as the channelized control streams and were even significantly more retentive than reference reaches. They felt that "restoration by replacement of boulders and woody debris can successfully reverse impacts of channelization and thus contribute to the efficient ecological functioning of impacted streams."

Wallace et al. (1995) performed an experiment by adding logs to the downstream riffle of three paired riffles to evaluate the biotic and abiotic response. Where logs were added stream depth increased, velocity decreased, fine bed material was deposited and both coarse and fine particulate organic matter increased dramatically. This had an immediate and significant impact on the invertebrate community structure as it shifted from scrapers and filterers too collectors and predators. When leaf litter decomposition was used to evaluate post-restoration recovery of stream function on a Kentucky stream, it was found that within the 9-month study period mean litter residence time of the restored reach was approximately equal to the upstream control reach (Gentry, 2005).

Shields and Knight (2003) assessed the effects of installing stone structures and planting the riparian area along a Mississippi stream. Ten years after work was completed they found improvements to both habitat and the fish communities. Mean water depth was twice that of untreated reaches. Woody riparian vegetation more than doubled and in-channel LWD increased by an order of magnitude. The fish population changed from numerous, small fish (cyprinids) to fewer large fish (centrarchids) which could support a fishery. LWD was found to be the preferred habitat of trout in North Carolina wilderness streams (Flebbe and Dolloff, 1995), and Roni and Quinn (2001) found that LWD placement in 30 western streams lead to increased densities of salmon and trout during certain times of the year.

Some organic nutrient inputs can be detrimental to stream ecosystems when they are artificial and excessive. Riparian vegetation can significantly benefit the stream by intercepting the movement of overland or subsurface nutrients. The demand for nutrients by riparian vegetation can greatly reduce dissolved nutrient loads moving down slope. Riparian forests in Maryland were found to remove three-quarters of the dissolved nitrate moving off of croplands and into an adjoining river (Peterjohn and Carrell, 1984). Lowrance et al. (1984) found that the riparian forest of a Georgia coastal plain stream was an excellent nutrient sink and buffered the nutrient discharge moving off of surrounding agricultural fields.

Establishing a riparian forest along restored streams is essential if the aquatic community is going to have an adequate source of organic material to support the food chain. Beyond this vital function, riparian vegetation also captures soil that is moving down slope to the stream. Riparian vegetation is a critical component to a properly functioning lotic ecosystem. LWD is an important component of natural streams and is utilized extensively in stream restoration projects, both as log structures and as root wads. Boulder structures are also a natural component of some streams and should be used where appropriate to enhance habitat and improve retention of organic material. These studies indicate that stream restoration structures, in concert with reestablishing the riparian forest that will provide organic material, can be successful at restoring a functioning stream ecosystem.

9.6.4 Sediment

Stream restoration projects are probably most often instigated to address obvious and chronic erosion and sedimentation problems. Geomorphic modifications and the placement of structures are often guided by the need to alter existing forces and situations that are causing stream banks to become unstable. Sediment is recognized by most if not all states as the worst pollutant of our nation's waterways. Waters (1995) in his extensive review of the literature dealing with sediment in streams states that "After a half-century of the most rigorous research,

it is now apparent that fine sediment, originating in a broad array of human activities, overwhelmingly constitutes one of the major environmental factors—perhaps the principal factor—in the degradation of stream fisheries."

Sediment is an insidious pollutant because it is natural for streams to carry a certain amount of sediment. In fact a stream bed that is heterogeneous in terms of sediment sizes will support the greatest diversity of insects (Minshall, 1984). However, when the "normal" amount or size of sediment changes it begins to degrade the aquatic environment. Sediment is considered a pollutant when the quantity and quality is unnatural. When this occurs the impact on all aquatic organisms in a stream system can be significant.

Three streams in the Piedmont ecoregion of North Carolina that differed in terms of land use within their drainages, being either forested, agricultural or urbanized, were compared (Lenat and Crawford, 1994). The forested stream differed from the other two streams which had similar water quality. Suspended sediment yield was greatest for the urban stream and least for the forested stream. Storm flows showed a similar pattern but suspended sediment concentrations were highest from the agricultural stream on low to moderate flows. Invertebrate sampling indicated that the agricultural stream was at a moderate stress level and the urban site had severe stress. Lemly (1982) examined the effects of inorganic sediment and nutrient enrichment on the benthic insect community of a southern Appalachian trout stream. Pollutants entered the stream at different points allowing an assessment of how sediment alone and sediment in association with nutrient enrichment impacted insect communities. Diversity and biomass of certain species were significantly reduced in the polluted zones. Sediment filling interstitial spaces and disrupting feeding was considered to be the primary factor affecting filter feeding taxa. Inorganic sediment directly affected stream insects by particles accumulating on body surfaces and respiratory structures. In the zone of nutrient enrichment, particle laden insects were also observed to have growths of filamentous bacteria. Thus, sediment and nutrient enrichment operated synergistically to eliminate a significantly greater number of stream insect taxa. Richards et al. (1993) sampled macroinvertebrate community composition in streams of a large Michigan watershed. Benthic communities of streams where agriculture was a primary land use were the most different from other streams. Substrate characteristics were the most important variable for explaining variation in benthic communities. Significant correlations were observed between substrate quality and the total numbers of Ephemeropteran, Plecopteran, and Trichopteran (EPT) taxa. This supports using EPT taxa as an indicator of stream quality.

There is a wide body of information on the effects of sediment on fish, particularly cold water species. Waters (1995) provides an extensive review of these studies. In the DO discussion above the impact of sediment on salmonids is explained relative to how it limits transfer of DO to incubating eggs. Cederholm et al. (1980) examined the effects of siltation from logging roads on salmonid spawning success. They found that the survival of eggs to emergence was inversely correlated with the proportion of fines when the percentage of fines exceeds the natural level of 10 percent. With every 1 percent increase in fines there is a rapid decline in survival to emergence. Binns (2004) analyzed wild trout abundance, biomass and habitat prior to and after 30 habitat enhancement projects by the state of Wyoming. Trout biomass and abundance increased for most of the projects. Cover for trout and pool depth significantly increased and erosion from stream banks significantly decreased. The influence of sediment on fish reproductive success varies with the reproductive guild of the fish (Balon, 1975). Species that depend on clean stony substrates to deposit their eggs in or on, suffer the greatest impacts and species that have floating eggs or that guard and clean their eggs will have the least impact. Sediment can also bury fish cover and habitat. Branson and Batch (1972) reported that some

fish species were eliminated from a Kentucky stream by mining activities that deposited clay sediments on the bottom of the stream to a depth of two to six inches.

Even amphibian populations have been shown to be affected by excessive sediment moving in a stream. Corn and Bury (1989) studied one species of frog and 3 species of salamanders in 43 streams in Oregon. Twenty-three were in forested watersheds and twenty were in watersheds that had been cut within 14 to 40 years of the study. Streams that were in the cut areas had greater deposits of sediment within the stream and had a smaller substrate particle size. All four amphibian species had higher densities and biomass in the uncut watersheds. Investigators attributed the difference to loss of interstitial spaces that the larvae of these species need for proper development.

Restoring a stream to its proper dimension, pattern and profile will create a channel that moves water and sediment through the reach without causing aggradation or degradation. The purpose of stream restoration using a natural channel design approach is to evaluate what geomorphology the channel needs to avoid having erosion or depositional problems. Common adjustments that restore stream stability might include developing a meandering pattern to increase stream length and reduce stream slope, adjusting the cross-section to provide good habitat while moving sediment through the reach, and installation of stream structures that protect eroding stream banks by reducing near bank shear stress.

The most common reason that stream banks become unstable and cause sedimentation of the stream is that the land adjoining the stream has been used in such a way that riparian woody vegetation is significantly diminished or eliminated. This inevitably results in unstable stream banks that erode at the bank toe and when erosion has caused sufficient loss of support the bank slumps. To mitigate this problem trees are planted to reestablish a stable stream bank. Wynn et al. (2004) found that at depths greater than 30 cm forested riparian sites had significantly greater fine and small root length density than did herbaceous sites. Since the greatest shear stress is at the toe of the stream bank and since erosion at the toe most often causes bank failures, trees should be planted along banks to protect the toe. Trees will produce a root system that will grow to a depth that allows the fine and small roots to bind with the soils, increasing the soil critical shear stress (Gray and Leiser, 1982). Dunaway et al. (1994) found that the erosion rate was inversely proportional to root volume. So restoration projects that enhance or reestablish woody vegetation along stream banks significantly reduce the likelihood of bank failure and sedimentation of the stream.

As demonstrated by this information, sediment significantly impacts the ability of aquatic organisms to survive and grow in a lotic environment. It could be said that stream restoration is completely about understanding and manipulating erosional and depositional processes, using abiotic and biotic structure. Successful restoration will result in a stream carrying a natural sediment load that promotes species diversity and health.

10.0 STREAM DESIGN PARAMETER SELECTION METHODOLOGY

Five main approaches are available to develop design criteria for channel dimension, pattern, and profile. For this particular project, reference reach databases, regime equations, and comparison to past projects were used. Each of the identified approaches is described in the following sections. A flow chart for selecting design criteria is shown in Figure A.9.

10.1 Upstream Reference Reaches

One option for developing design criteria is to locate a reference reach upstream of the project site. A reference reach is a channel segment that is stable—neither aggrading nor degrading—and is of the same morphological type as the channel under consideration for restoration. The reference reach should also have a similar valley slope as the project reach. The reference reach is then used as the blueprint for the channel design (Rosgen, 1998). To account for differences in drainage area and discharge between a reference site and a project site, data on channel characteristics (dimension, pattern, and profile), in the form of dimensionless ratios, are developed for the reference reach. If the reach upstream of the project does not have sufficient pattern, but does have a stable riffle cross-section, only dimension ratios are calculated. It is ideal to measure a reference bankfull dimension that was formed under the same environmental influences as the project reach, if available.

10.2 Reference Reach Searches

If a reference reach cannot be located upstream of the project reach, a review of a reference reach database is performed. A database search is conducted to locate known reference reaches in close proximity to the project site and includes streams with the same valley as the project reach and stream type as the design. If references are found meeting these criteria, the reference reach is field-surveyed for validation and comparison with the database values, which may have been originally collected and provided by a third party. If a search of the database reveals no references that meet the appropriate criteria, a field search is performed locally to identify a reference reach that has not yet been surveyed.

Potential reference reaches are identified by first evaluating USGS topographic quadrangles and aerial photography for an area. In general, the search is limited to subwatersheds within or adjacent to the project watershed. In certain cases, a reference reach may be identified farther away that matches the same valley and stream type as the proposed design of the project site. In such a case, care is taken to ensure that the potential reference reach lies within the same physiographic region as the project reach. Potential reference sites identified on maps are then evaluated in the field to determine if they are stable systems of the appropriate stream and valley type. If appropriate, reference reach surveys are conducted. When potential sites are located on private property, landowner permission is acquired prior to conducting any survey work.

10.3 Reference Reach Databases

Because a reference reach was not found in close proximity to the project site, a reference reach database was consulted, and summary ratios were acquired for streams with the same valley and stream type within the project's physiographic region. These ratios were then compared to literature values and regime equations, along with ratios developed through the evaluation of successful projects.

Due to the limited number of reference reaches near the project site, a reference reach database from its existing data was developed. Stable riffle cross-sections in nearby watersheds with drainage areas below 1 square mile have been developed with dimension design criteria. Bankfull cross-sectional area and width have also been measured and then plotted as a function of the drainage area (regional curves, Figure A.10 and Figure A.11). The regional curves developed by Baker determine the dimension and the bankfull cross-sectional area for a given stream.

10.4 Regime Equations

A variety of published journals, books, and design manuals were used to cross reference database values with peer-reviewed regime equations. Examples include Fluvial Forms and Processes by David Knighton (1998), Mountain Rivers by Ellen Wohl (2000), and the Hydraulic Design of Stream Restoration Projects by the USACE (Copeland et al., 2001). One common regime equation used in our designs is the evaluation of pattern for design of meandering channels; for example, most reference reach surveys in the eastern United States show radius of curvature divided by bankfull width ratios much less than 1.5. The Corps manual recommends a ratio greater than 2.0 to maintain stability in free-forming systems. Since most stream restoration projects are constructed on floodplains denude of woody vegetation, we often use the Corps-recommended value rather than reference reach data. Meander wavelength and pool-to-pool spacing ratios are examples of other parameters that are sometimes designed with higher ratios than those observed on reference reaches, for reasons similar to those described for radius of curvature.

10.5 Comparison to Past Projects

All of the above techniques for developing ratios and/or regime equations are compared to past projects built under similar conditions. Ultimately, these sites provide the best pattern and profile ratios because they reflect site conditions after construction. While most reference reaches are in mature forests, restoration sites are in floodplains with little or no mature woody vegetation. This lack of mature woody vegetation severely alters floodplain processes and streambank conditions. If past ratios did not provide adequate stability or bedform diversity, they are not used; conversely, if past project ratios created stable channels with optimal bedform diversity, they will be incorporated into the design.

Ultimately, the design criteria are selections of ratios and equations made upon a thorough evaluation of the above tasks. Combinations of approaches may be used to optimize the design. The final selection of design criteria for the restoration site is discussed in the CMP.

11.0 SEDIMENT TRANSPORT COMPETENCY AND CAPACITY METHODOLOGY

Stream restoration designs must be tested to ensure that the new channel dimensions (in particular, the design bankfull mean depth) create a stream that has the ability to move its sediment load without aggrading or degrading over long periods of time. This process was performed for the off-site restoration reaches in the Hell Creek watershed. The ability of the stream to transport its total sediment load can be understood through two measures: sediment transport competency and sediment transport capacity. Competency is a stream's ability to move particles of a given size and is a measurement of force, often expressed as units of pounds per square foot (lbs/ft^2). Sediment transport capacity is a stream's ability to move a quantity of sediment and is a measurement of stream power, often expressed as units of watts/square meter. Sediment transport capacity is also calculated as a sediment transport rating curve, which provides an estimate of the quantity of total sediment load transported through a cross-section per unit of time. The curve is provided as a sediment transport rate in pounds per second (lbs/sec) versus discharge or stream power.

The total sediment load transported through a cross-section can be divided by type of movement into bedload and suspended load fractions. Bedload is generally composed of larger particles, such as course sand, gravels, and cobbles, which are transported by rolling, sliding, or hopping (saltating) along the bed. Suspended load is normally composed of fine sand, silt, and clay particles transported in the water column.

11.1 Competency Analysis

Median substrate size has an important influence on the mobility of particles in stream beds. Critical dimensionless shear stress (τ_{ci}) is the measure of force required to initiate general movement of particles in a bed of a given composition. At shear stresses exceeding this critical value, essentially all grain sizes are transported at rates in proportion to their presence in the bed (Wohl, 2000). τ_{ci} can be calculated for gravel bed stream reaches using surface and subsurface particle samples from a stable, representative riffle in the reach (Andrews, 1983). Critical dimensionless shear stress is calculated as follows (Rosgen, 2001b):

a) Calculate the ratio d_{50}/ds_{50}

where: d_{50} = median diameter of the riffle bed (from 100 count in riffle or pavement sample)
ds_{50} = median diameter of the bar sample (or subpavement)

If the ratio d_{50}/ds_{50} is between the values of 3.0 and 7.0, then calculate the critical dimensionless shear stress using Equation 1.

$$\tau_{ci} = 0.0834(d_{50}/ds_{50})^{-0.872} \quad \textbf{(Equation 1)}$$

b) If the ratio d_{50}/ds_{50} is not between the values of 3.0 and 7.0, then calculate the ratio of D_i/d_{50}

where: D_i = largest particle from the bar sample (or subpavement)
d_{50} = median diameter of the riffle bed (from 100 count in the riffle or pavement sample)

If the ratio D_i/d_{50} is between the values of 1.3 and 3.0, then calculate the critical dimensionless shear stress using Equation 2.

$$\tau_{ci} = 0.0384(D_i/d_{50})^{-0.887} \quad \textbf{(Equation 2)}$$

11.2 Aggradational Analysis

The aggradation analysis is based on calculations of the required depth and slope needed to transport large sediment particles, in this case defined as the largest particle of the riffle subpavement sample. Required depth can be compared with the existing/design mean riffle depth, and required slope can be compared to the existing and design slopes to verify that the stream has sufficient competency to move large particles (and thus prevent thalweg aggradation). The required depth and slope are calculated by:

$$d_r = \frac{1.65\tau_{ci}D_i}{S_e} \quad \textbf{(Equation 3)}$$

$$s_r = \frac{1.65\tau_{ci}D_i}{d_e} \quad \textbf{(Equation 4)}$$

where: d_r = required bankfull mean depth (ft)
d_e= design bankfull mean depth (ft)
1.65 = sediment density (submerged specific weight)
= density of sediment (2.65) – density of water (1.0)
τ_{ci} = critical dimensionless shear stress
D_i = largest particle from bar sample (or subpavement) (ft)
s_r = required bankfull water surface slope (ft/ft)
S_e = design bankfull water surface slope (ft/ft)

The aggradation analysis is used to assess both existing and design conditions; for example, if the calculated value for the existing critical depth is significantly larger than the measured maximum

bankfull depth, this indicates that the stream is aggrading. Alternately, if the proposed design depth significantly differs from the calculated critical depth, and the analysis is deemed appropriate for the site conditions, the design dimensions should be revised accordingly.

11.3 Competency Analysis Using Shields Curve

As a complement to the required depth and slope calculations, boundary shear stresses for a design riffle cross-section can be compared with a modified Shields Curve to predict sediment transport competency. The shear stress placed on the sediment particles is the force that entrains and moves the particles, given by:

$$\tau = \gamma R s \qquad \textbf{(Equation 5)}$$

where: τ = shear stress (lb/ft^2)
γ = specific gravity of water (62.4 lb/ft^3)
R = hydraulic radius (ft)
s = average channel slope (ft/ft)

The boundary shear stress can be estimated for the design cross-section and plotted on a modified Shields curve, as shown in Figure A.8. The particle size that Shields Curve predicts will be moved is compared to the D_i of the site subpavement. Shields Curve predicts whether the design conditions will have enough shear stress to move a particle larger than the largest subpavement particle found in the creek and prevent aggradation.

11.4 Degradation Analysis

A degradation analysis is performed in order to assess whether the design cross-sections will result in scour and bed downcutting. The potential for degradation may be evaluated by examining the upper competency limits for design cross-sections and by reviewing existing and design grade control at the site. The calculated shear stress discussed in Section 2.7.3 can be used to describe the upper competency limits for the design channel. The calculated shear stress is compared to the Modified Shields Curve to determine the largest particle size that stress value will move. This value should be comparable to the values from the reach-wide pebble count.

11.5 Sediment Transport Capacity

For fine-grained stream beds, sediment transport capacity is much more important than competency. Sediment transport capacity refers to the stream's ability to move a mass of sediment past a cross-section per unit of time in pounds/second or tons/year. Sediment transport capacity can be assessed directly using actual monitored data from bankfull events if a sediment transport rating curve has been developed for the project site. Since this curve development is extremely difficult, other empirical relationships are used to assess sediment transport capacity. The most common capacity equation is stream power. Stream power can be calculated a number of ways, but the most common is the following:

$$w = \gamma Q S / W_{bkf} \qquad \textbf{(Equation 6)}$$

where: w = mean stream power (W/m^2)
γ = specific weight of water 9,810 N/m^3); $\gamma = \rho g$, where ρ is the density of the water-sediment mixture (1,000 kg/m^3) and g is the acceleration due to gravity 9.81 m/s^2)
Q = bankfull discharge (m^3/s)
S = design channel slope (m/m)
Wbkf = bankfull channel width (m)
Note: 1 ft-lb/sec/ft^2 = 14.56 W/m^2

Equation 6 does not provide a sediment transport rating curve; however, it does describe the stream's ability to accomplish work, i.e., move sediment. Calculated stream power values are compared to reference and published values. If deviations from known stable values for similar stream types and slopes are observed, the design should be reassessed to confirm that sediment will be adequately transported through the system without containing excess energy in the channel.

12.0 IN-STREAM STRUCTURES

There are a variety of in-stream structural elements used in restoration. Figure A.12 illustrates a few typical structures. These elements are comprised of natural materials, such as stone, wood, and live vegetation. Their shape and location works with the flow dynamics to reinforce, stabilize, and enhance the function of the stream channel. In-stream structures provide three primary functions: grade control, streambank protection, and habitat enhancement.

12.1 Grade Control

Grade control pertains mainly to the design bed profile. A newly excavated gravel stream bed with a slope greater than 0.5 percent is seldom able to maintain the desired slopes and bed features, such as riffles, runs, pools, and glides, until a pavement/subpavement layer has been established. Stone and/or log structures installed at the bed elevation and at critical locations in the plan view help to set up the new stream bed for long-term vertical stability. Over time, as the new channel adjusts to its sediment transport regime and vegetative root mass establishes on the banks, the need for grade control diminishes.

12.2 Bank Protection

Bank protection is critical during and after construction, as bank and floodplain vegetation is establishing a reinforcing root mass. This vegetation establishment lasts for several years, but vegetation typically provides meaningful bank protection after two to four growing seasons. Bank protection structures generally provide both reinforcement to the streambanks and re-direction of flow away from the banks and toward the center of the channel.

12.3 Habitat Enhancement

Habitat enhancement can take several forms and is often a secondary function of grade control and bank protection structures. Flow over vanes and wing deflectors create scour pools, which provide diversity of in-stream habitat. Boulder clusters form eddies that provide resting places for aquatic species. Vane structures and step pools encourage oxygenation of the water. Root wads provide cover and shade and encourage the formation of deep pools at the outside of meander bends.

12.4 Selection of Structure Types

Table A.1 summarizes the names and functions of several in-stream structures.

Table A.1
Functions of In-Stream Structures

Structure	Function (Primary = 1, Secondary = 2)		
	Grade Control	Bank Protection	Habitat Enhancement
Cross vane	1	1	2
Single arm vane		1	2
J-hook vane	2	1	2

Structure	Function (Primary = 1, Secondary = 2)		
	Grade Control	Bank Protection	Habitat Enhancement
Constructed riffle	1	1	2
Log weir	1		2
Wing deflector	2	1	1
Boulder cluster			1
Root wad		1	1
Brush mattress		1	2
Cover log			1

The selection of structure types and locations typically follows dimension, pattern, and profile design. In some situations, structures comprise the main, or possibly only, effort to restore a stream. More often, structures are used in conjunction with grading, realignment, and planting, in an effort to improve channel stability and aquatic habitat.

13.0 STREAM AND BUFFER VEGETATION

The planting of additional and/or more desirable vegetation is an important aspect of the restoration plan. Vegetation helps stabilize streambanks, creates habitat and food sources for wildlife, lowers water temperature by stream shading, improves water quality by filtering overland flows, and improves the aesthetics of the site.

The reforestation component of a restoration project may include live dormant staking of the streambanks, riparian buffer planting, invasive species removal, and seeding for erosion control. The streambanks and the riparian area are typically planted with both woody and herbaceous vegetation to establish a diverse streamside buffer. Planting the streambanks is a desirable means of erosion control because of the dynamic, adaptive, and self-repairing qualities of vegetation. Vegetative root systems stabilize channel banks by holding soil together, increasing porosity and infiltration, and reducing soil saturation through transpiration. During high flows, plants lie flat, and stems and leaves shield and protect the soil surface from erosion. In most settings, vegetation is more aesthetically appropriate than engineered stabilization structures.

The most appropriate source of plant material for any project is the site itself. If practical, desirable plants that need to be removed in the course of construction may be salvaged and transplanted as part of the restoration plan. Under some situations, native plant may be transplanted from areas nearby. This transplant process ensures that the plants are native and adapted to the locale. Most sites will require that some, if not all, plants be purchased from a commercial provider. They should be obtained from a nearby, reputable nursery that guarantees that the plants are native and appropriate for the locale and climate of the project site.

13.1 Live Staking

Live staking is a method of re-vegetation that utilizes live, dormant cuttings from appropriate species to establish vegetation cheaply and effectively. The installation of live stakes on streambanks serves to protect the banks from erosion and at the same time, provides habitat, shade, and improved aesthetics. Live staking must take place during the dormant season. Live stakes can be gathered locally or purchased from a commercial supplier. Stakes should be at least one half inch and no more than two inches in diameter, between two and three feet in length, and living, as

evidenced by the presence of young buds and green bark. Stakes are cut at an angle on the bottom end and driven into the ground with a rubber mallet.

13.2 Transplanted Vegetation

Transplanting is a method of removing desirable vegetation from one location on the project site and replanting it at another location on the site. In most cases, the vegetation being moved would otherwise be destroyed during restoration; for example, vegetation growing along the toe of a deeply incised channel would be destroyed when water was routed into a new stream channel and the old channel was backfilled. Transplanted vegetation provides immediate shading to the restored stream, as well as living root mass to increase streambank stability and create holding areas for fish and aquatic biota.

Transplants are excavated using a loader or mechanized excavator, such that the complete root mass and surrounding soil are removed intact. The transplant is then placed in an excavated hole along the streambank, generally around the outside of a meander bend, where establishment of vegetation is crucial to streambank stability.

13.3 Riparian Buffer Re-Vegetation

Riparian buffers are naturally occurring ecosystems adjacent to rivers and streams and provide numerous benefits and system functions. Buffers are important in nutrient and pollutant removal in overland flow and may provide for additional subsurface water quality improvement in the shallow groundwater flow. Buffers also provide habitat and travel corridors for wildlife populations and are an important recreational resource. It is also important to note that riparian buffer areas help to moderate the quantity and timing of runoff from the upland landscape and contribute to the groundwater recharge process.

Buffers are most valuable and effective when comprised of a combination of trees, shrubs, and herbaceous plants. Width generally increases the capacity of riparian buffers to improve water quality and provide habitat value (Fischer and Fischenich, 2000). An minimum width of 50 - 100 feet has been adopted for protection by many regulatory agencies as the required width for creating beneficial forest structure and riparian habitat (West Virginia Surface Mining Rule 38-02; North Carolina Administrative Code 15A NCAC 2B .0233).

In stream and wetland restoration, where buffer width is often limited, the following design principles apply:

- Design for sheet flow into and across the riparian buffer area.
- If possible, the width of the riparian buffer area should be proportional to the watershed area, the slope of the terrain, and the velocity of the flow through the buffer.
- Forest structure should include understory and canopy species. Canopy species are particularly important adjacent to waterways to moderate stream temperatures and to create habitat.
- Use native plants that are adapted to the site conditions (e.g., climate, soils, and hydrology). In suburban and urban settings, riparian forested buffers do not need to resemble natural ecosystems to improve water quality and habitat.

14.0 RISK RECOGNITION

It is important to recognize the risks inherent in the assessment, design, and construction of environmental restoration projects. Such endeavors involve the interpretation of existing conditions to deduce appropriate design criteria, the application of those criteria to design, and most important, the execution of the construction phase. There are many factors that ultimately determine the success of these projects; many are beyond the influence of a designer, and compiling all of them is beyond the scope of this report. It is impossible to consider and to design for all of them, but it is important to acknowledge those factors, such as daily temperatures, amount and frequency of rainfall during and following construction, subsurface conditions, and changes in watershed characteristics, that are beyond the control of the designer.

Many restoration sites will require some post-construction maintenance, primarily because newly planted vegetation plays a large role in channel and floodplain stability. Stream restoration projects are most vulnerable to adjustment and erosion immediately after construction, before vegetation has had a chance to become fully established. Risk of instability diminishes with each growing season. Streams and floodplains usually become self-maintaining after the second year of growth, although unusually heavy floods often cause erosion, deposition, and/or loss of vegetation in even the most stable channels and forested floodplains. A contingency plan and adaptive management plan are provided in the CMP (CMP Sections 11.0 and 13.0, respectively) to compensate for risks associated with the proposed mitigation plan.

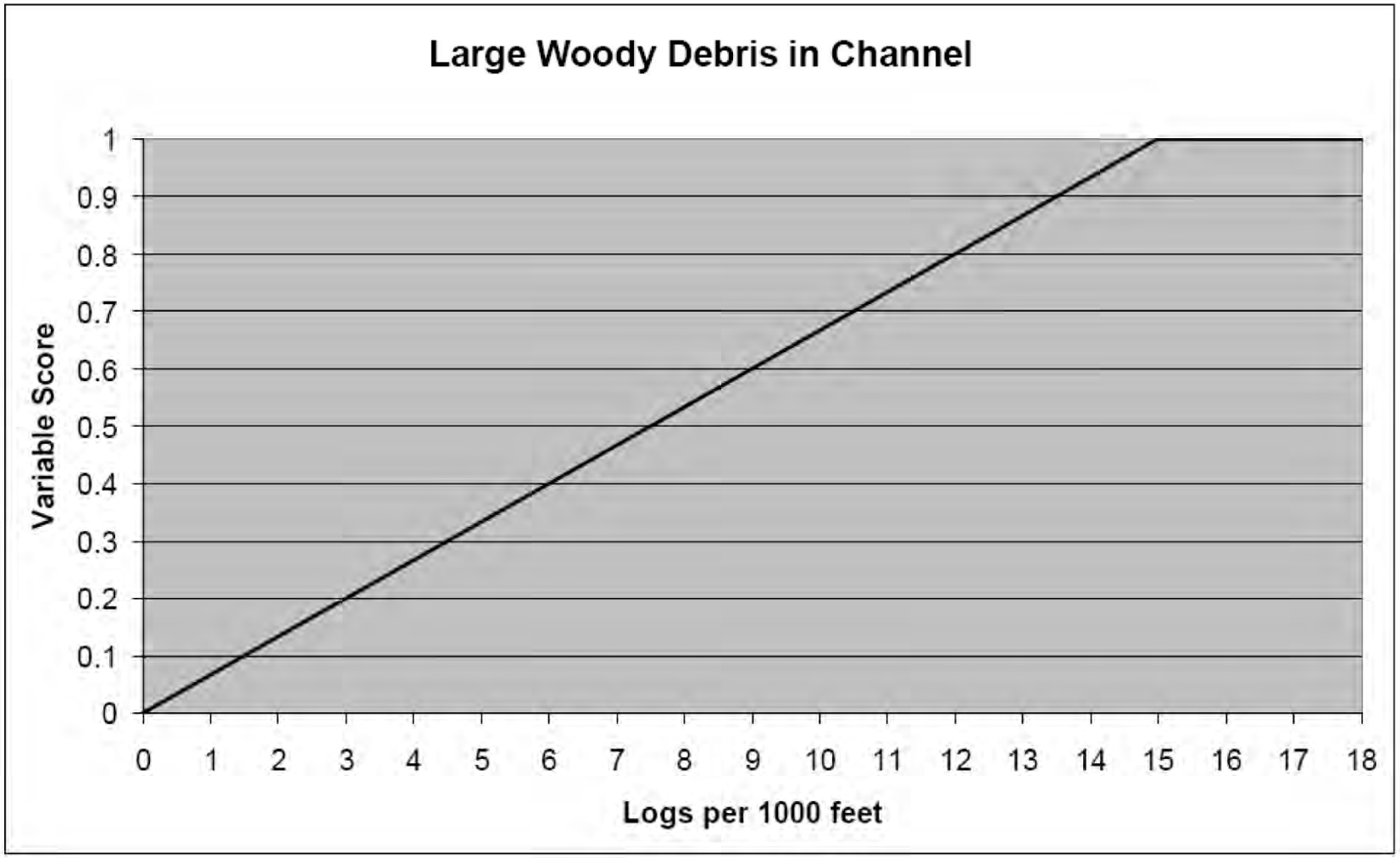

FIGURE A.1 – LARGE WOODY DEBRIS IN CHANNEL (LWDEBRIS)

CONSOL of Kentucky Inc.
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Canonsburg, PA 15317

Baker

Function Pyramid

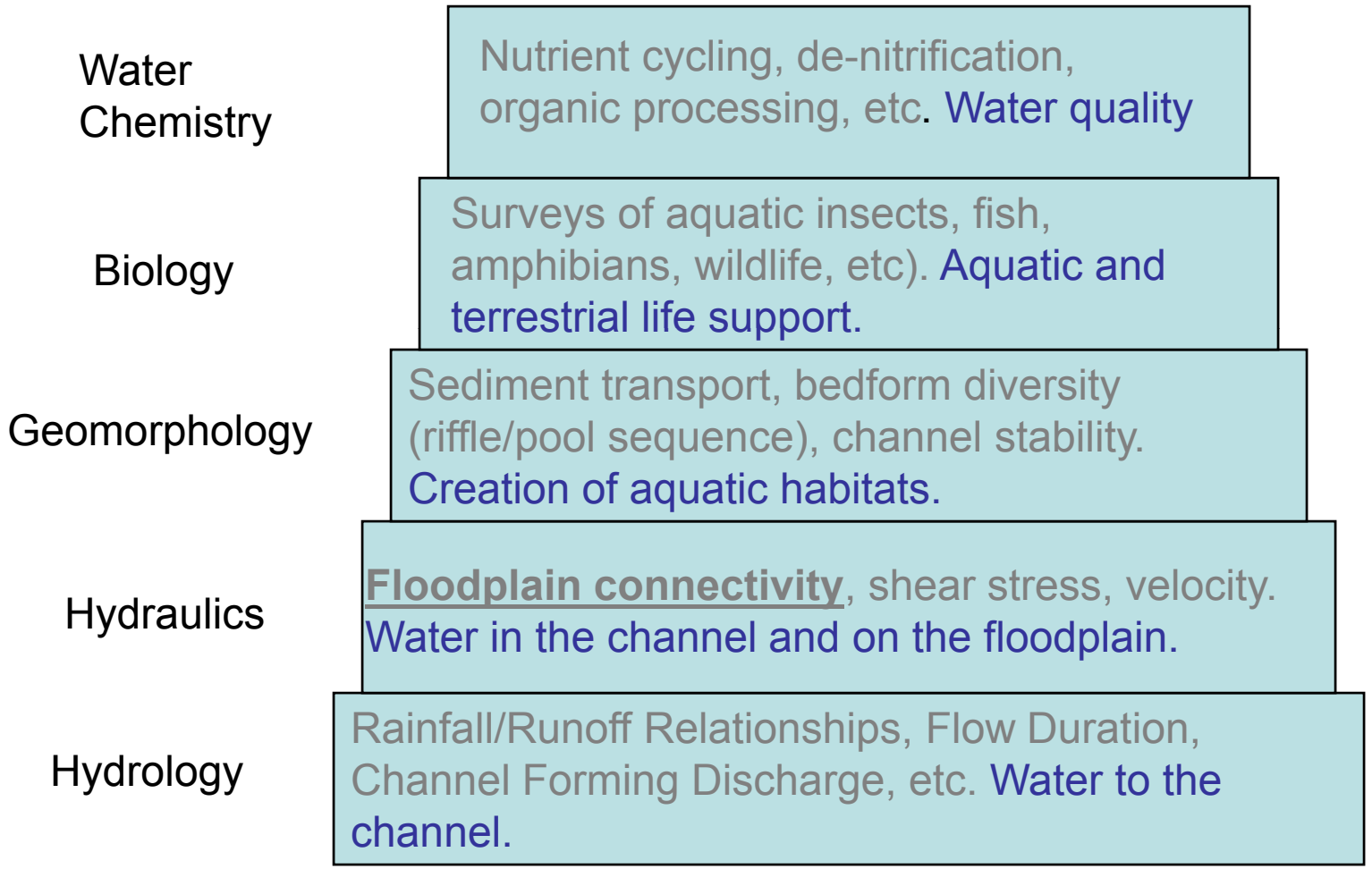

FIGURE A.2 - FUNCTION PYRAMID

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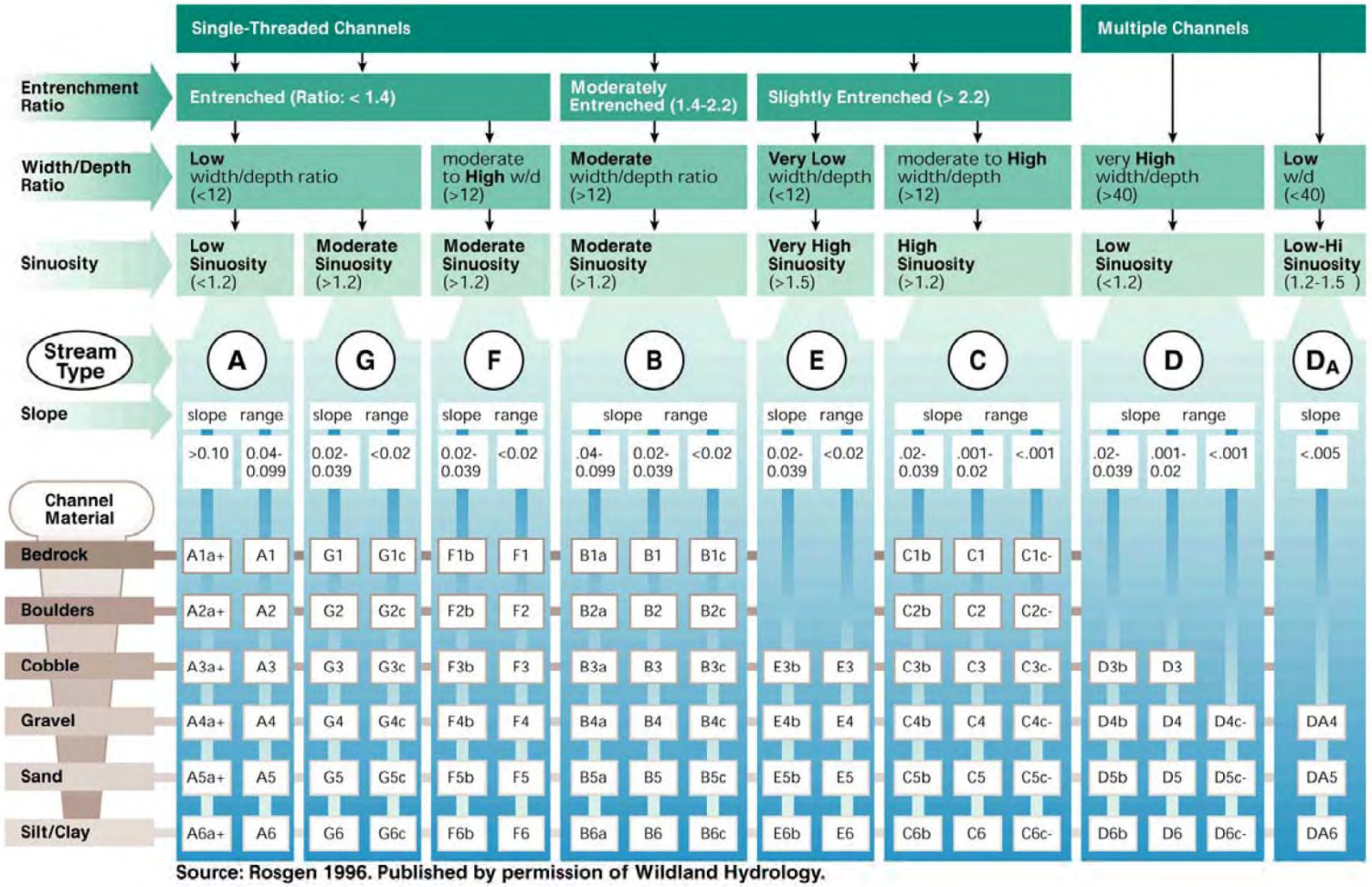

Source: Rosgen 1996. Published by permission of Wildland Hydrology.

Fig. 7.12 – Rosgen's stream classification system (Level II).
In Stream Corridor Restoration: Principles, Processes, and Practices, 10/98.
Interagency Stream Restoration Working Group (FISRWG)(15 Federal agencies of the US).

Figure A.3 – ROSGEN STREAM CLASSIFICATION

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Source: Rosgen, David L., Applied River Morphology, Wildland Hydrology, 1996

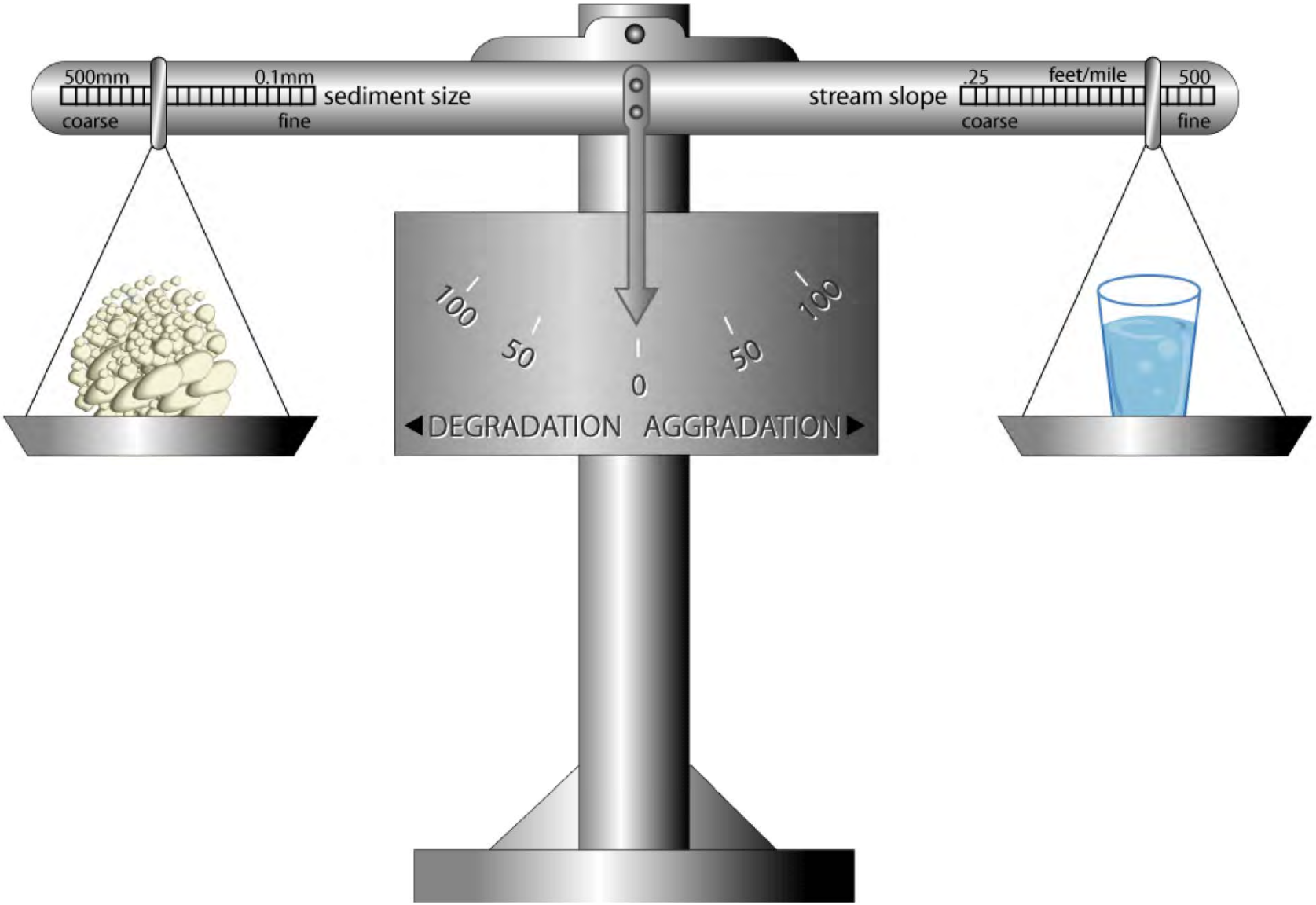

Figure A.4 – FACTORS INFLUENCING STREAM STABILITY

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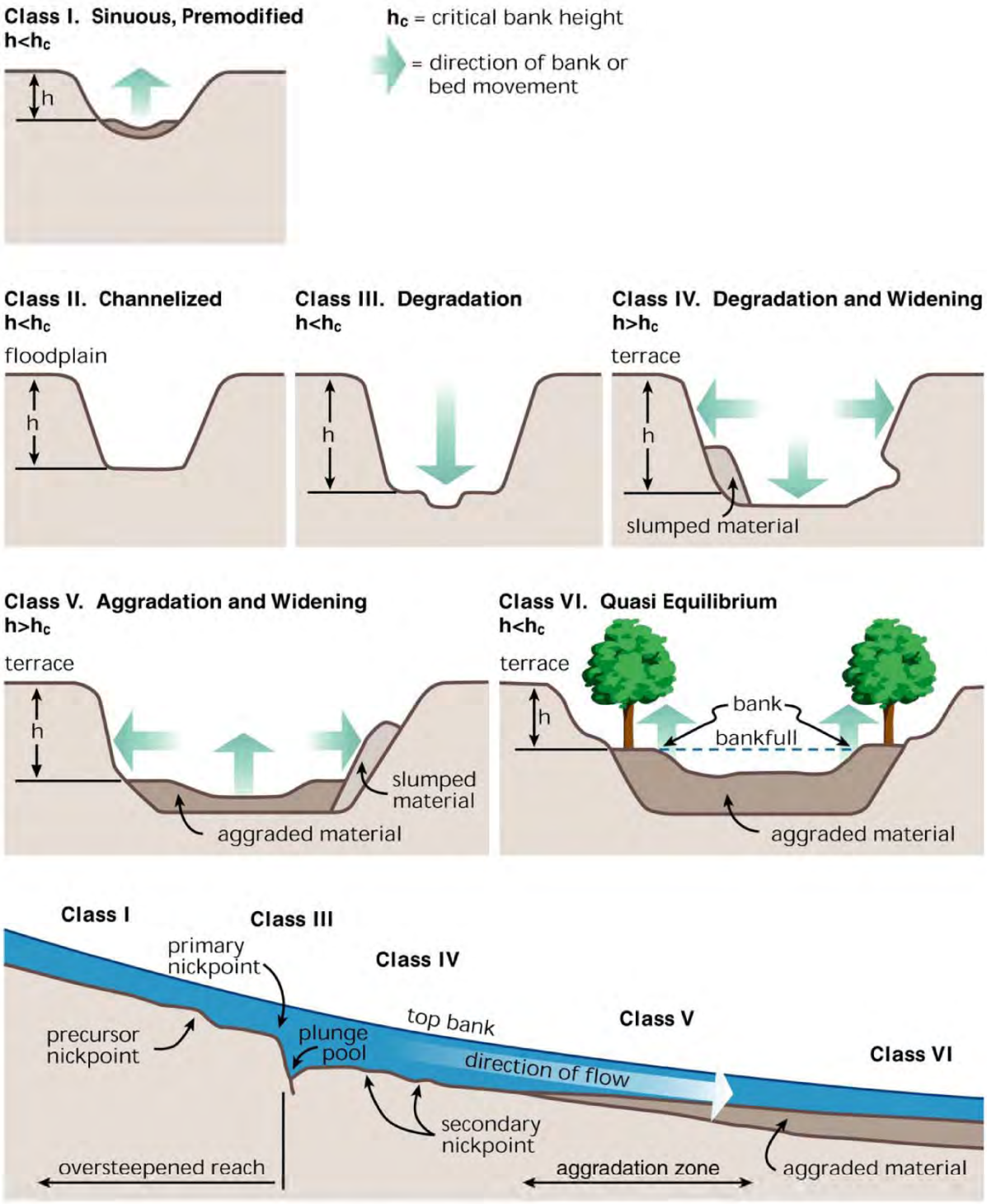
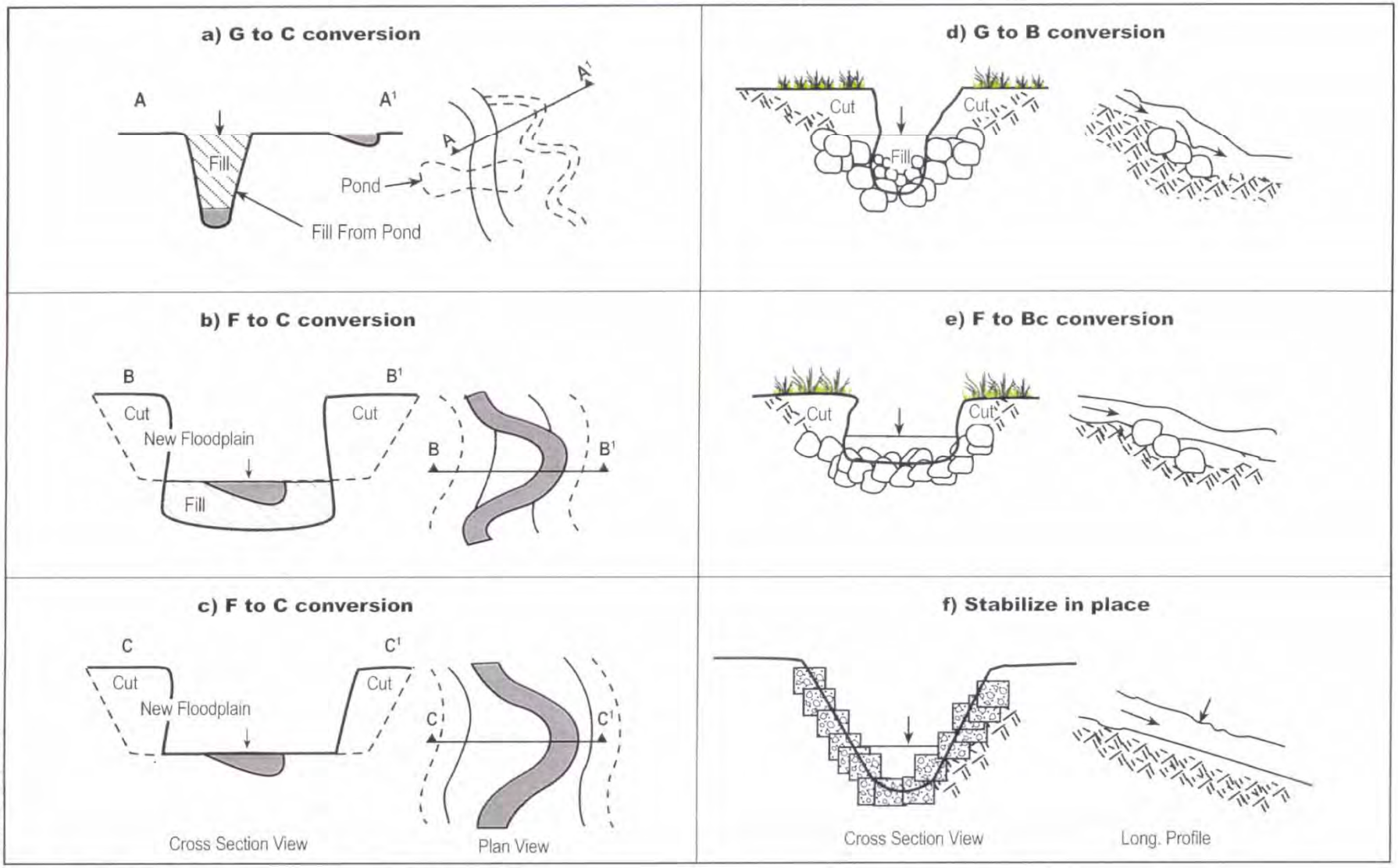
After: Lane, 1955



Source: Simon, 1989; US Army Corps of Engineers, 1990.
Fig. 7.14 -- Channel evolution model..
In Stream Corridor Restoration: Principles, Processes, and Practices, 10/98.
Interagency Stream Restoration Working Group (FISRWG)(15 Federal agencies of the US).

FIGURE A.5 – SIMON CHANNEL EVOLUTION MODEL



Source: Rosgen, David L., "A Geomorphological Approach to Restoration of Incised Rivers," *Proceedings of the Conference on Management of Landscapes Disturbed by Channel Incision*, 1997

Figure A.6 – FACTORS INFLUENCING STREAM STABILITY

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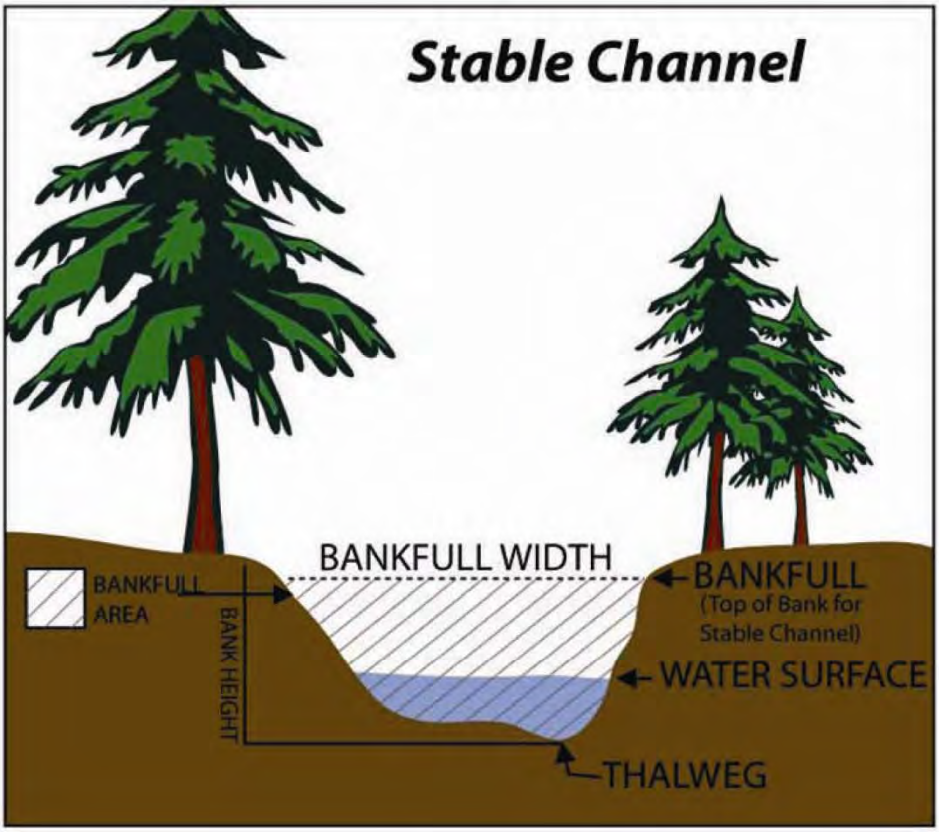
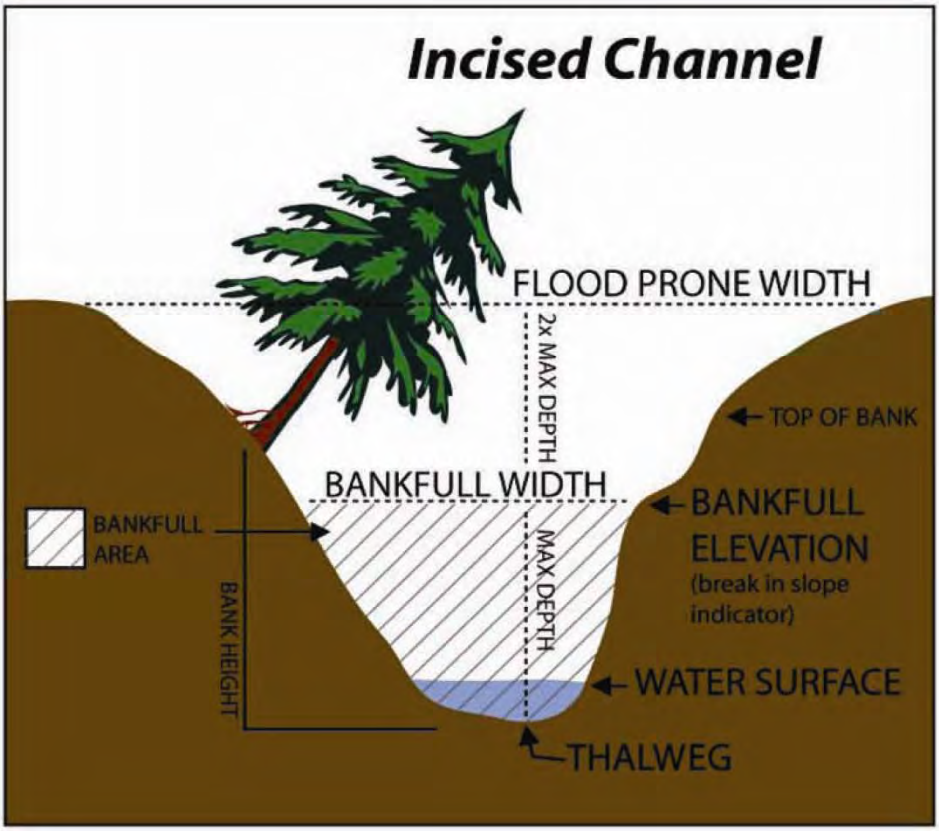
Baker





Channel Dimension Measurements

Bankfull Elevation is associated with the channel forming discharge. It is the point where channel processes and flood plain processes begin.

Bankfull width: the distance between the left bank bankfull elevation and the right bank bankfull elevation

Bankfull mean depth: the average depth from bankfull elevation to the bottom of the stream channel

Max depth (dmax): the deepest point within the cross-section measured to the bankfull elevation

Width to Depth Ratio: Bankfull width ÷ Bankfull mean depth

Bank Height Ratio: Bank height (measured from top of bank to the bottom of the stream channel) ÷ the max depth of the bankfull elevation (dmax)

Flood Prone Width: Width measured at the elevation of two times (2x) the maximum depth at bankfull (dmax)

Entrenchment Ratio: Floodprone width ÷ bankfull width

FIGURE A.7 – CHANNEL DIMENSION MEASUREMENTS

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

Baker

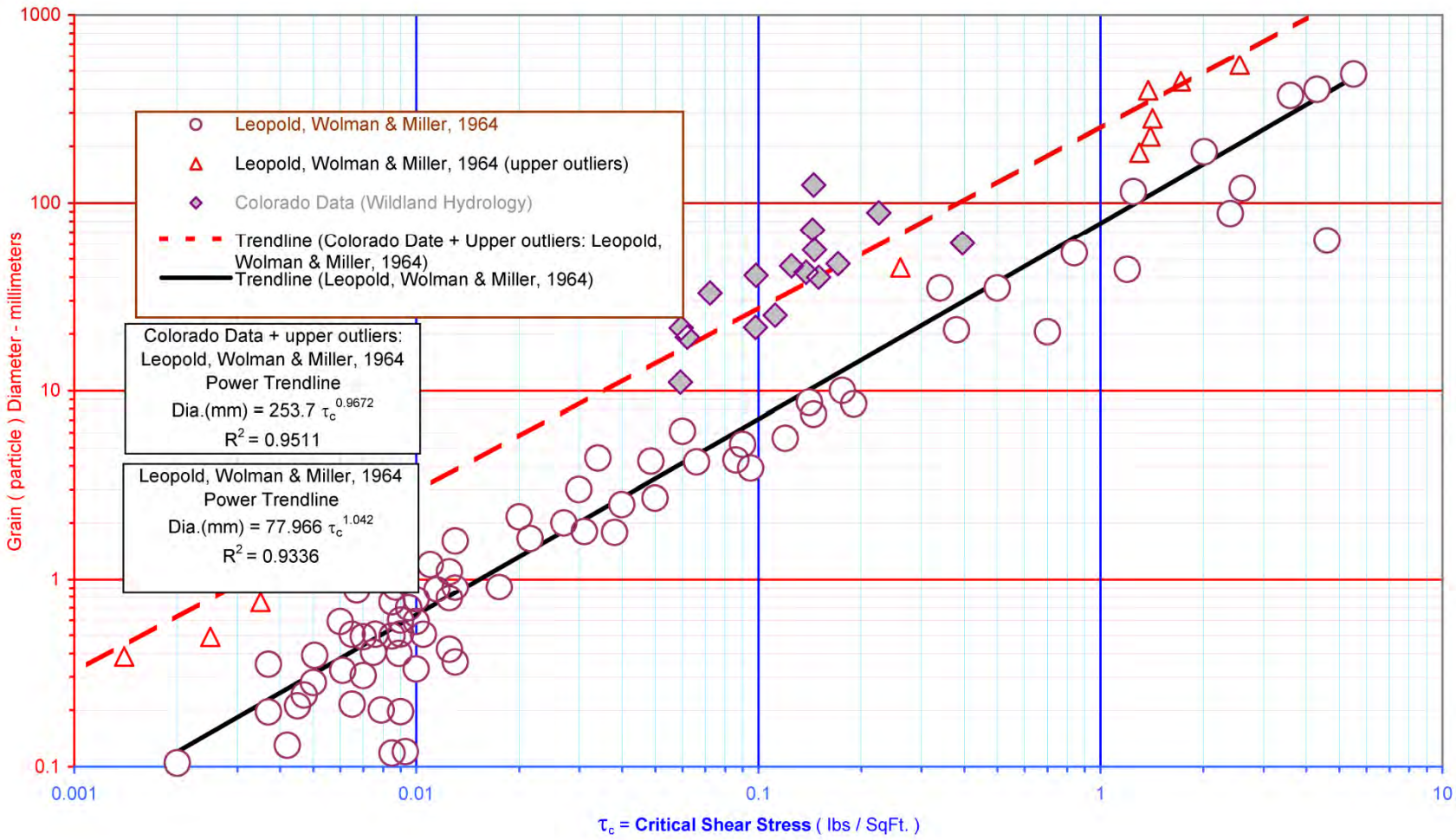


Figure A.8 – CRITICAL SHEAR STRESS CURVE (FROM USEPA WATERSHED ASSESSMENT OF RIVER STABILITY & SEDIMENT SUPPLY (WARSSS) v1.0)

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

Baker

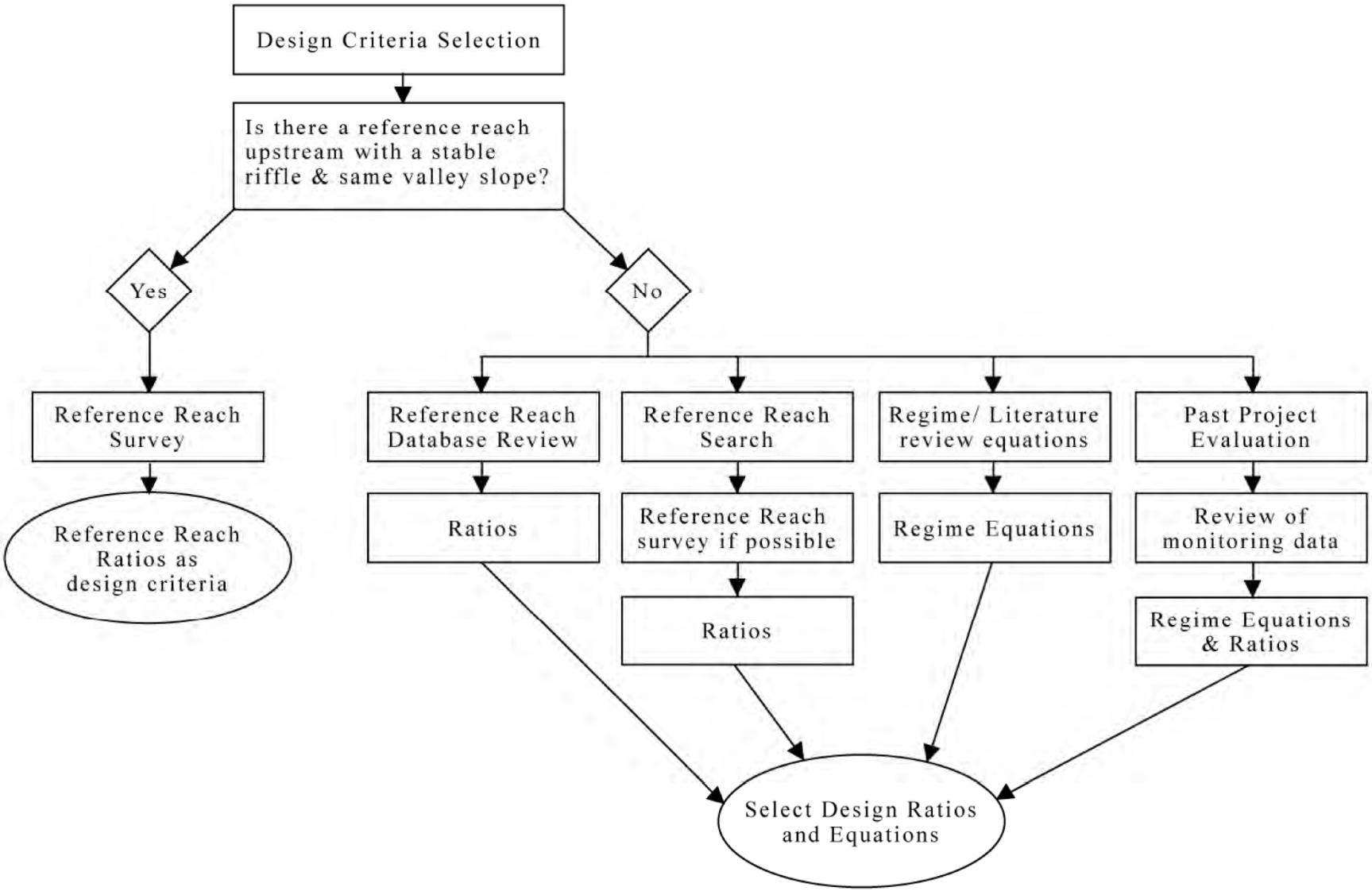


Figure A.9 – DESIGN CRITERIA SELECTION

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

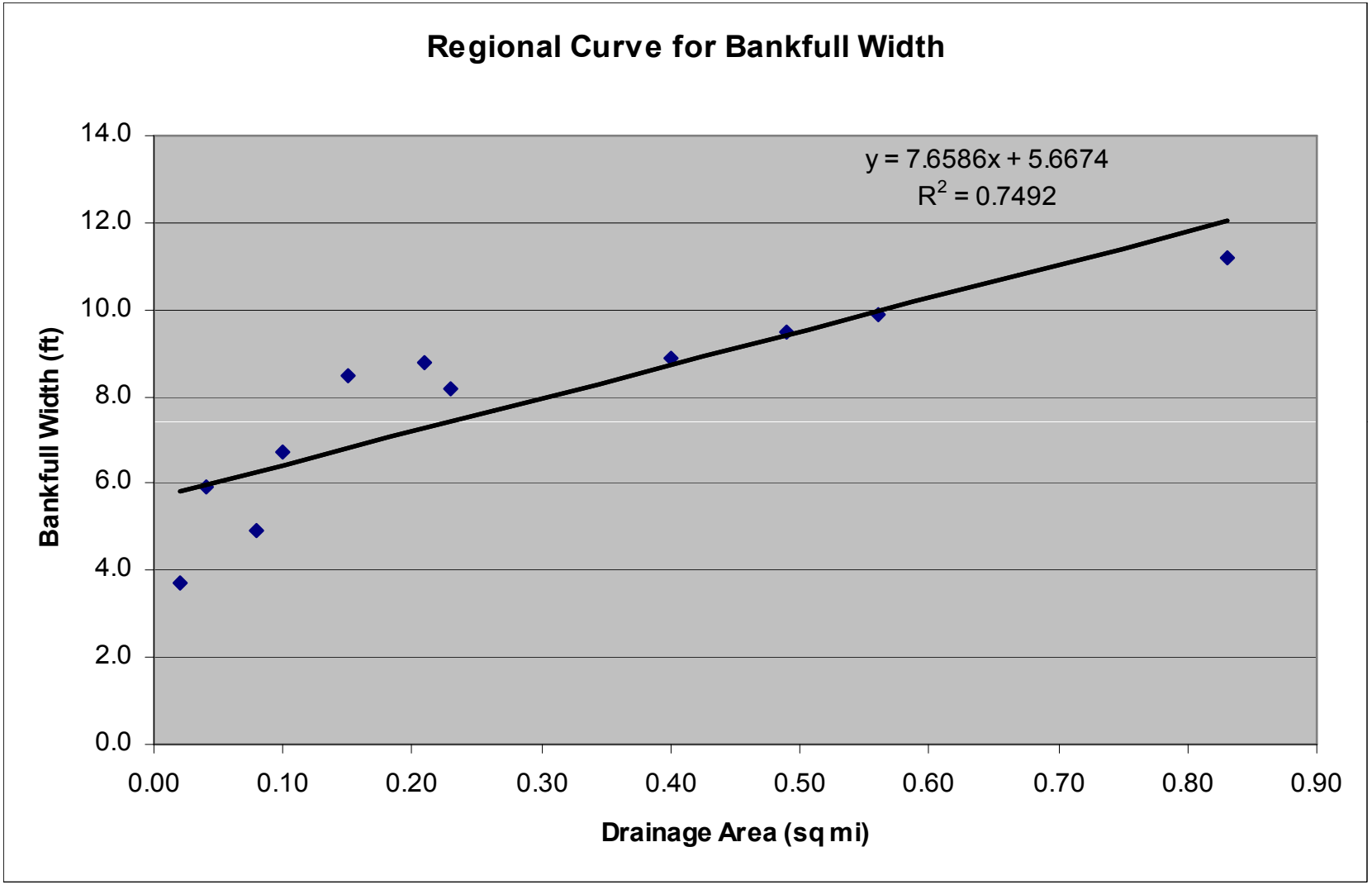


Figure A.10 – BANKFULL WIDTH REGIONAL CURVE

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

Baker

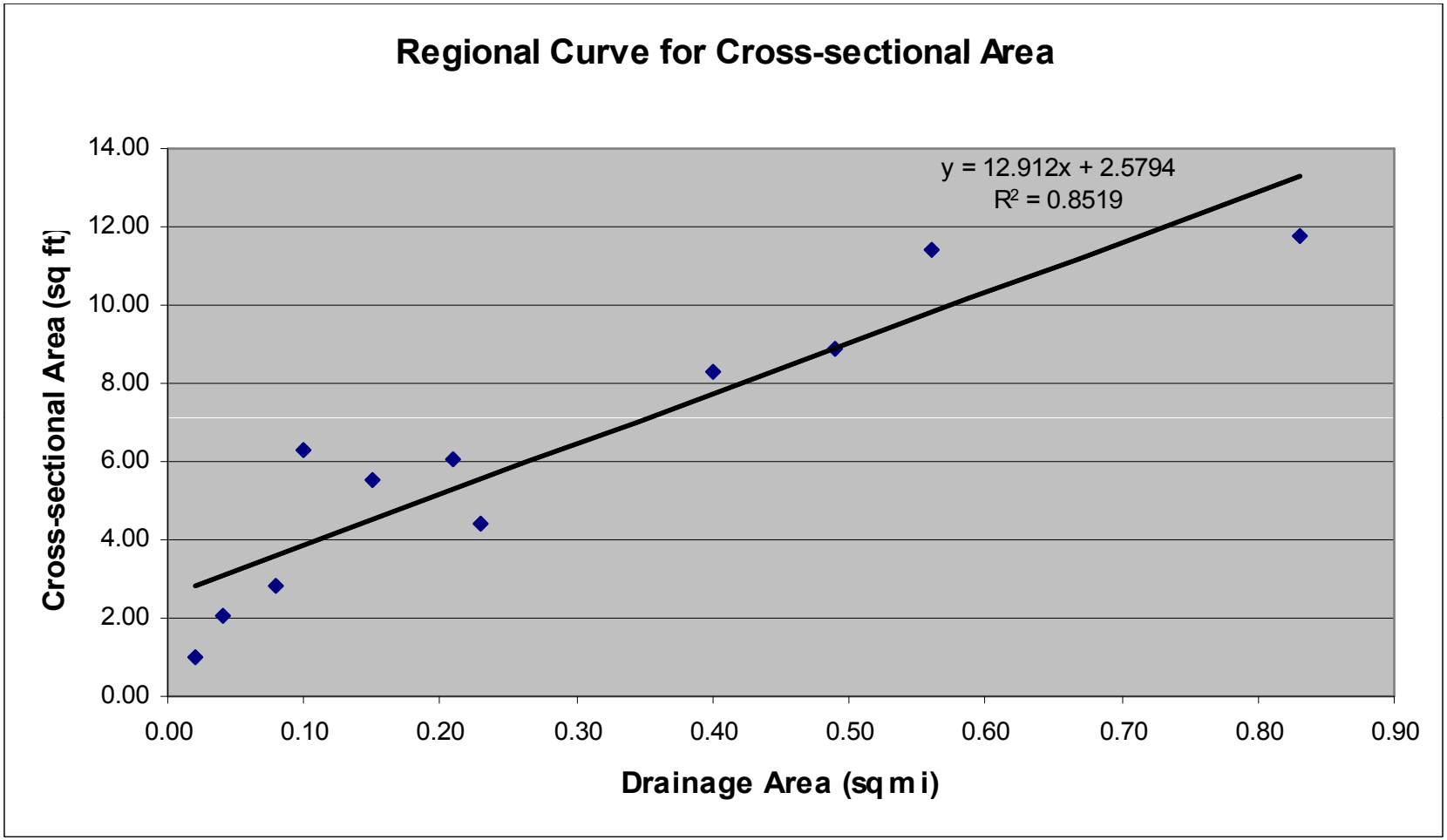
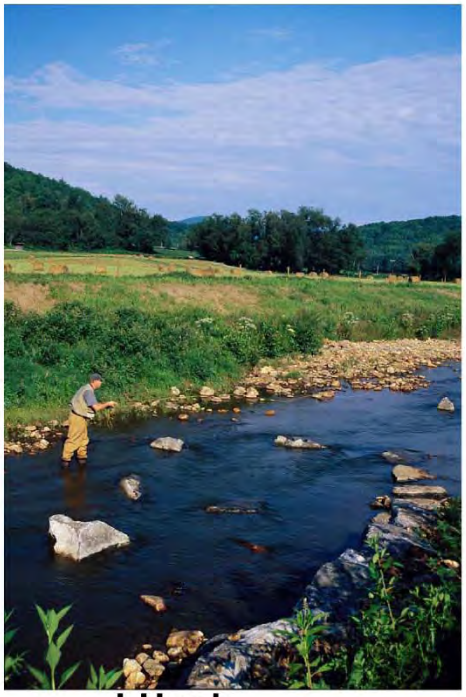


Figure A.11 – CROSS-SECTIONAL AREA REGIONAL CURVE

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



J-Hook

Double Wing Deflector

Double Drop Rock Cross Vane

Rock Vane

Figure A.12 – EXAMPLES OF IN-STREAM STRUCTURES

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

APPENDIX B

WEST VIRGINIA'S INTERIM FUNCATIONAL ASSESSMENT APPROACH (IFAA)

PROPOSED IMPACT CHANNELS

PROPOSED PERMANENT IMPACT CHANNELS

Site Name - **Ruth Trace Branch** Assessment Date - **10/29/07**

Impact Area (acres) - **0.15** Impacted Stream Length (feet) - **1,730**

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	80	1.00	80.0
restored	0	0.75	0.0
incised or excess sediment in channel	20	0.50	10.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.90

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	40	1.00	40.0
gravel (3/4 to 3 in.)	18	0.75	13.5
sand	2	0.50	1.0
silt	0	0.10	0.0
clay/pavement	40	0.00	0.0
		Variable Score	0.55

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	100	1.00	100.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	100	1.00	100.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
Variable Score	1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
28	1730	1.079
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.97	1685
Biogeochemical Functions	0.97	1685
Plant Community Functions	0.95	1641
Habitat Functions	0.91	1578

Herbaceous	Function Score	FCU
Hydrology Functions	0.80	1376
Biogeochemical Functions	0.77	1340
Plant Community Functions	0.00	0
Habitat Functions	0.80	1382

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 45' 52.71"
Longitude:	82° 14' 52.38"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 12 of Ruth Trace Branch **Assessment Date -** 10/30/07

Impact Area (acres) - 0.02 **Impacted Stream Length (feet) -** 300

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**100**	1.00	100.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**100**	1.00	100.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**0**	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**60**	1.00	60.0
gravel (3/4 to 3 in.)	**10**	0.75	7.5
sand	**0**	0.50	0.0
silt	**30**	0.10	3.0
clay/pavement	**0**	0.00	0.0
		Variable Score	**0.71**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**100**	1.00	100.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**100**	1.00	100.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
8	300	1.778
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**1.00**	**300**
Biogeochemical Functions	**1.00**	**300**
Plant Community Functions	**1.00**	**300**
Habitat Functions	**0.98**	**293**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.82**	**245**
Biogeochemical Functions	**0.82**	**245**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.86**	**258**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 45' 27.39"
Longitude:	82° 15' 4.06"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 13 of Ruth Trace Branch **Assessment Date -** 10/30/07

Impact Area (acres) - 0.02 **Impacted Stream Length (feet) -** 272

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**100**	1.00	100.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**100**	1.00	100.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**0**	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**75**	1.00	75.0
gravel (3/4 to 3 in.)	**12**	0.75	9.0
sand	**0**	0.50	0.0
silt	**13**	0.10	1.3
clay/pavement	**0**	0.00	0.0
		Variable Score	**0.85**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**100**	1.00	100.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**100**	1.00	100.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
2	272	0.490
	Variable Score	**0.49**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.93**	**253**
Biogeochemical Functions	**0.96**	**260**
Plant Community Functions	**1.00**	**272**
Habitat Functions	**0.94**	**257**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.76**	**206**
Biogeochemical Functions	**0.70**	**192**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.82**	**222**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 45' 24.83"
Longitude:	82° 15' 5.47"
Topo Quad:	Naugatuck

Remarks:

Photos	
Identifier	Description

Site Name - Unnamed Tributary 15 of Ruth Trace Branch **Assessment Date -** 10/30/07

Impact Area (acres) - 0.06 **Impacted Stream Length (feet) -** 920

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**100**	1.00	100.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**100**	1.00	100.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**0**	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**60**	1.00	60.0
gravel (3/4 to 3 in.)	**30**	0.75	22.5
sand	**5**	0.50	2.5
silt	**5**	0.10	0.5
clay/pavement	**0**	0.00	0.0
		Variable Score	**0.86**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**100**	1.00	100.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**100**	1.00	100.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
34	920	2.465
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**1.00**	**920**
Biogeochemical Functions	**1.00**	**920**
Plant Community Functions	**1.00**	**920**
Habitat Functions	**0.99**	**909**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.82**	**751**
Biogeochemical Functions	**0.82**	**751**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.88**	**808**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 45' 16.68"
Longitude:	82° 15' 10.08"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 17 of Ruth Trace Branch **Assessment Date -** 10/30/07

Impact Area (acres) - 0.09 **Impacted Stream Length (feet) -** 1,086

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**90**	1.00	90.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**10**	0.50	5.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.95**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**100**	1.00	100.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**0**	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**70**	1.00	70.0
gravel (3/4 to 3 in.)	**15**	0.75	11.3
sand	**0**	0.50	0.0
silt	**10**	0.10	1.0
clay/pavement	**5**	0.00	0.0
		Variable Score	**0.82**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**100**	1.00	100.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**100**	1.00	100.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
39	1086	2.395
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.99**	**1072**
Biogeochemical Functions	**0.99**	**1072**
Plant Community Functions	**0.97**	**1059**
Habitat Functions	**0.96**	**1043**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.81**	**875**
Biogeochemical Functions	**0.80**	**864**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.85**	**926**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 45' 13.08"
Longitude:	82° 15' 15.28"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 1 of Unnamed Tributary 17 of Ruth Trace Branch **Assessment Date -** 10/29/07

Impact Area (acres) - 0.08 **Impacted Stream Length (feet) -** 800

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	100	1.00	100.0
restored	0	0.75	0.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	1.00

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	80	1.00	80.0
gravel (3/4 to 3 in.)	15	0.75	11.3
sand	0	0.50	0.0
silt	5	0.10	0.5
clay/pavement	0	0.00	0.0
		Variable Score	0.92

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	100	1.00	100.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	100	1.00	100.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
34	800	2.834
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	1.00	800
Biogeochemical Functions	1.00	800
Plant Community Functions	1.00	800
Habitat Functions	0.99	794

Herbaceous	Function Score	FCU
Hydrology Functions	0.82	653
Biogeochemical Functions	0.82	653
Plant Community Functions	0.00	0
Habitat Functions	0.89	708

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 45' 6.09"
Longitude:	82° 13' 15.93"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 18 of Ruth Trace Branch **Assessment Date -** 10/29/07

Impact Area (acres) - 0.07 **Impacted Stream Length (feet) -** 800

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**95**	1.00	95.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**5**	0.50	2.5
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.98**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**100**	1.00	100.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**0**	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**70**	1.00	70.0
gravel (3/4 to 3 in.)	**20**	0.75	15.0
sand	**0**	0.50	0.0
silt	**10**	0.10	1.0
clay/pavement	**0**	0.00	0.0
		Variable Score	**0.86**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**100**	1.00	100.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**100**	1.00	100.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
43	800	3.585
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.99**	**795**
Biogeochemical Functions	**0.99**	**795**
Plant Community Functions	**0.99**	**790**
Habitat Functions	**0.98**	**781**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.81**	**649**
Biogeochemical Functions	**0.81**	**645**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.87**	**694**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 45' 13.15"
Longitude:	82° 15' 16.41"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 19 of Ruth Trace Branch **Assessment Date -** 10/29/07

Impact Area (acres) - 0.00 **Impacted Stream Length (feet) -** 100

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**100**	1.00	100.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**100**	1.00	100.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**0**	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**80**	1.00	80.0
gravel (3/4 to 3 in.)	**20**	0.75	15.0
sand	**0**	0.50	0.0
silt	**0**	0.10	0.0
clay/pavement	**0**	0.00	0.0
		Variable Score	**0.95**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**100**	1.00	100.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**100**	1.00	100.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
2	100	1.334
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**1.00**	**100**
Biogeochemical Functions	**1.00**	**100**
Plant Community Functions	**1.00**	**100**
Habitat Functions	**1.00**	**100**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.82**	**82**
Biogeochemical Functions	**0.82**	**82**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.89**	**89**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 45' 513.82"
Longitude:	82° 15' 21.59"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Right Fork Conley Branch **Assessment Date -** 10/29/07

Impact Area (acres) - 0.10 **Impacted Stream Length (feet) -** 826

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**100**	1.00	100.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**100**	1.00	100.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**0**	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**30**	1.00	30.0
gravel (3/4 to 3 in.)	**28**	0.75	21.0
sand	**7**	0.50	3.5
silt	**3**	0.10	0.3
clay/pavement	**32**	0.00	0.0
		Variable Score	**0.55**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**100**	1.00	100.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**100**	1.00	100.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
25	826	2.018
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**1.00**	**826**
Biogeochemical Functions	**1.00**	**826**
Plant Community Functions	**1.00**	**826**
Habitat Functions	**0.96**	**794**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.82**	**674**
Biogeochemical Functions	**0.82**	**674**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.84**	**696**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 44' 55.48"
Longitude:	82° 14' 25.71"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 1 of Right Fork Conley Branch **Assessment Date -** 10/30/07

Impact Area (acres) - 0.08 **Impacted Stream Length (feet) -** 740

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**98**	1.00	98.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**2**	0.10	0.2
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.98**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**98**	1.00	98.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**2**	0.10	0.2
		Variable Score	**0.98**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**35**	1.00	35.0
gravel (3/4 to 3 in.)	**35**	0.75	26.3
sand	**3**	0.50	1.5
silt	**7**	0.10	0.7
clay/pavement	**20**	0.00	0.0
		Variable Score	**0.63**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**100**	1.00	100.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**100**	1.00	100.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
42	740	3.785
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.99**	**734**
Biogeochemical Functions	**0.99**	**736**
Plant Community Functions	**0.99**	**733**
Habitat Functions	**0.96**	**711**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.81**	**599**
Biogeochemical Functions	**0.81**	**597**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.84**	**625**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 44' 55.48"
Longitude:	82° 14' 25.71"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 2 of Unnamed Tributary 1 of Right Fork Conley Branch **Assessment Date -** 10/30/07

Impact Area (acres) - 0.01 **Impacted Stream Length (feet) -** 135

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**100**	1.00	100.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**100**	1.00	100.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**0**	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**35**	1.00	35.0
gravel (3/4 to 3 in.)	**60**	0.75	45.0
sand	**0**	0.50	0.0
silt	**5**	0.10	0.5
clay/pavement	**0**	0.00	0.0
		Variable Score	**0.81**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**100**	1.00	100.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**100**	1.00	100.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
1	135	0.494
	Variable Score	**0.49**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.93**	**126**
Biogeochemical Functions	**0.96**	**129**
Plant Community Functions	**1.00**	**135**
Habitat Functions	**0.94**	**127**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.76**	**102**
Biogeochemical Functions	**0.71**	**95**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.81**	**110**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 44' 36.19"
Longitude:	82° 14' 24.86"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 4 of Right Fork Conley Branch **Assessment Date -** 10/30/07

Impact Area (acres) - 0.03 **Impacted Stream Length (feet) -** 450

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	100	1.00	100.0
restored	0	0.75	0.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	1.00

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	40	1.00	40.0
gravel (3/4 to 3 in.)	40	0.75	30.0
sand	0	0.50	0.0
silt	20	0.10	2.0
clay/pavement	0	0.00	0.0
		Variable Score	0.72

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	100	1.00	100.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	100	1.00	100.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
10	450	1.482
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	1.00	450
Biogeochemical Functions	1.00	450
Plant Community Functions	1.00	450
Habitat Functions	0.98	439

Herbaceous	Function Score	FCU
Hydrology Functions	0.82	367
Biogeochemical Functions	0.82	367
Plant Community Functions	0.00	0
Habitat Functions	0.86	388

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 44' 52.43"
Longitude:	82° 14' 52.30"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 5 of Right Fork Conley Branch **Assessment Date -** 10/30/07

Impact Area (acres) - 0.02 **Impacted Stream Length (feet) -** 300

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**100**	1.00	100.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**100**	1.00	100.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**0**	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**68**	1.00	68.0
gravel (3/4 to 3 in.)	**20**	0.75	15.0
sand	**0**	0.50	0.0
silt	**12**	0.10	1.2
clay/pavement	**0**	0.00	0.0
		Variable Score	**0.84**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**100**	1.00	100.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**100**	1.00	100.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
16	300	3.557
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**1.00**	**300**
Biogeochemical Functions	**1.00**	**300**
Plant Community Functions	**1.00**	**300**
Habitat Functions	**0.99**	**296**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.82**	**245**
Biogeochemical Functions	**0.82**	**245**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.88**	**263**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 44' 49.41"
Longitude:	82° 15' 1.25"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Left Fork Conley Branch **Assessment Date -** 10/31/07

Impact Area (acres) - 0.21 **Impacted Stream Length (feet) -** 2,152

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**100**	1.00	100.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**98**	1.00	98.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**2**	0.10	0.2
		Variable Score	**0.98**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**30**	1.00	30.0
gravel (3/4 to 3 in.)	**33**	0.75	24.8
sand	**0**	0.50	0.0
silt	**17**	0.10	1.7
clay/pavement	**20**	0.00	0.0
		Variable Score	**0.56**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**98**	1.00	98.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**2**	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**98**	1.00	98.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**2**	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
130	2152	4.029
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.99**	**2138**
Biogeochemical Functions	**1.00**	**2142**
Plant Community Functions	**0.99**	**2138**
Habitat Functions	**0.96**	**2069**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.81**	**1749**
Biogeochemical Functions	**0.81**	**1753**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.84**	**1817**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 45' 18.31"
Longitude:	82° 14' 5.35"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Right Fork Hell Creek **Assessment Date -** 10/29/07

Impact Area (acres) - 0.16 **Impacted Stream Length (feet) -** 1,485

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	40	1.00	40.0
restored	0	0.75	0.0
incised or excess sediment in channel	60	0.50	30.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.70

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	6	0.75	4.5
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	4	0.10	0.4
		Variable Score	0.95

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	24	1.00	24.0
gravel (3/4 to 3 in.)	62	0.75	46.5
sand	1	0.50	0.5
silt	0	0.10	0.0
clay/pavement	13	0.00	0.0
		Variable Score	0.71

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	89	1.00	89.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	5	0.25	1.3
urban, roads	6	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	0	1.00	0.0
70 to 90	89	0.75	66.8
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	11	0.00	0.0
		Variable Score	0.67

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	89	1.00	89.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	11	0.00	0.0
		Variable Score	0.89

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	90	1.00	90.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	10	0.10	1.0
		Variable Score	0.91

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
26	1485	1.168
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.86	1272
Biogeochemical Functions	0.86	1279
Plant Community Functions	0.77	1147
Habitat Functions	0.78	1156

Herbaceous	Function Score	FCU
Hydrology Functions	0.72	1067
Biogeochemical Functions	0.67	995
Plant Community Functions	0.00	0
Habitat Functions	0.71	1056

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	CM CF
County:	Mingo
Latitude:	37° 44' 1.00"
Longitude:	82° 13' 38.60"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 1 of Right Fork Hell Creek **Assessment Date -** 10/31/07

Impact Area (acres) - 0.03 **Impacted Stream Length (feet) -** 600

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	85	1.00	85.0
restored	0	0.75	0.0
incised or excess sediment in channel	15	0.50	7.5
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.93

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	30	1.00	30.0
gravel (3/4 to 3 in.)	10	0.75	7.5
sand	10	0.50	5.0
silt	10	0.10	1.0
clay/pavement	40	0.00	0.0
		Variable Score	0.44

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	80	1.00	80.0
shrub	20	0.75	15.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.95

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	5	1.00	5.0
70 to 90	70	0.75	52.5
50 to 69	25	0.50	12.5
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	0.70

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	0	1.00	0.0
20 to 50	30	0.50	15.0
10 to 19	10	0.25	2.5
less than 10	60	0.00	0.0
		Variable Score	0.18

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	20	1.00	20.0
50 to 75	50	0.75	37.5
25 to 49	30	0.50	15.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	0.73

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
19	600	2.112
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	80	1.00	80.0
2 to 4% slope with common step pools	20	0.50	10.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		0.90

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.86	518
Biogeochemical Functions	0.83	499
Plant Community Functions	0.76	456
Habitat Functions	0.85	511

Herbaceous	Function Score	FCU
Hydrology Functions	0.78	468
Biogeochemical Functions	0.74	444
Plant Community Functions	0.00	0
Habitat Functions	0.78	468

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	CF JM
County:	Mingo
Latitude:	37° 44' 1.03"
Longitude:	82° 13' 42.98"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 10 of Unnamed Tributary 1 of Right Fork Hell Creek **Assessment Date -** 10/31/07

Impact Area (acres) - 0.01 **Impacted Stream Length (feet) -** 80

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	80	0.50	40.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	20	0.00	0.0
		Variable Score	0.40

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	15	1.00	15.0
gravel (3/4 to 3 in.)	10	0.75	7.5
sand	25	0.50	12.5
silt	40	0.10	4.0
clay/pavement	10	0.00	0.0
		Variable Score	0.39

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	0	1.00	0.0
70 to 90	40	0.75	30.0
50 to 69	25	0.50	12.5
20 to 49	35	0.25	8.8
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	0.51

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	0	1.00	0.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	100	0.00	0.0
		Variable Score	0.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
Variable Score	1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	25	1.00	25.0
50 to 75	75	0.75	56.3
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	0.81

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
6	80	5.002
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	90	1.00	90.0
2 to 4% slope with common step pools	10	0.50	5.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		0.95

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.69	55
Biogeochemical Functions	0.67	53
Plant Community Functions	0.45	36
Habitat Functions	0.56	45

Herbaceous	Function Score	FCU
Hydrology Functions	0.65	52
Biogeochemical Functions	0.50	40
Plant Community Functions	0.00	0
Habitat Functions	0.52	41

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	CF JM
County:	Mingo
Latitude:	37° 44' 12.40"
Longitude:	82° 14' 16.73"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 11 of Unnamed Tributary 1 of Right Fork Hell Creek **Assessment Date -** 10/31/07

Impact Area (acres) - 0.09 **Impacted Stream Length (feet) -** 1,080

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	90	1.00	90.0
restored	0	0.75	0.0
incised or excess sediment in channel	10	0.50	5.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.95

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	35	1.00	35.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	5	0.50	2.5
silt	5	0.10	0.5
clay/pavement	25	0.00	0.0
		Variable Score	0.61

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	0	1.00	0.0
70 to 90	80	0.75	60.0
50 to 69	10	0.50	5.0
20 to 49	10	0.25	2.5
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	0.68

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	0	1.00	0.0
20 to 50	30	0.50	15.0
10 to 19	70	0.25	17.5
less than 10	0	0.00	0.0
		Variable Score	0.33

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	5	1.00	5.0
50 to 75	85	0.75	63.8
25 to 49	10	0.50	5.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	0.74

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
51	1080	3.149
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	95	1.00	95.0
2 to 4% slope with common step pools	5	0.50	2.5
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		0.98

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.90	970
Biogeochemical Functions	0.87	941
Plant Community Functions	0.80	859
Habitat Functions	0.89	960

Herbaceous	Function Score	FCU
Hydrology Functions	0.80	868
Biogeochemical Functions	0.79	849
Plant Community Functions	0.00	0
Habitat Functions	0.82	891

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	CF JM
County:	Mingo
Latitude:	37° 44' 12.28"
Longitude:	82° 14' 17.30"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 4 of Right Fork Hell Creek **Assessment Date -** 10/30/07

Impact Area (acres) - 0.17 **Impacted Stream Length (feet) -** 1,195

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	90	1.00	90.0
restored	0	0.75	0.0
incised or excess sediment in channel	10	0.50	5.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.95

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	50	1.00	50.0
gravel (3/4 to 3 in.)	20	0.75	15.0
sand	10	0.50	5.0
silt	5	0.10	0.5
clay/pavement	15	0.00	0.0
		Variable Score	0.71

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	0	1.00	0.0
70 to 90	90	0.75	67.5
50 to 69	10	0.50	5.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	0.73

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	0	1.00	0.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	100	0.00	0.0
		Variable Score	0.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
Variable Score	1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	80	1.00	80.0
50 to 75	0	0.75	0.0
25 to 49	15	0.50	7.5
10 to 24	0	0.25	0.0
less than 10	5	0.10	0.5
		Variable Score	0.88

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
67	1195	3.739
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	85	1.00	85.0
2 to 4% slope with common step pools	15	0.50	7.5
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		0.93

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.87	1037
Biogeochemical Functions	0.85	1014
Plant Community Functions	0.74	883
Habitat Functions	0.91	1088

Herbaceous	Function Score	FCU
Hydrology Functions	0.80	954
Biogeochemical Functions	0.77	915
Plant Community Functions	0.00	0
Habitat Functions	0.83	992

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	CF JM
County:	Mingo
Latitude:	37° 43' 48.24"
Longitude:	82° 13' 50.04"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 3 of Unnamed Tributary 4 of Right Fork Hell Creek **Assessment Date -** 10/30/07

Impact Area (acres) - 0.03 **Impacted Stream Length (feet) -** 310

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	100	1.00	100.0
restored	0	0.75	0.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	1.00

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	40	1.00	40.0
gravel (3/4 to 3 in.)	20	0.75	15.0
sand	10	0.50	5.0
silt	10	0.10	1.0
clay/pavement	20	0.00	0.0
		Variable Score	0.61

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	0	1.00	0.0
70 to 90	100	0.75	75.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	0.75

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	0	1.00	0.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	100	0.00	0.0
		Variable Score	0.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	0	1.00	0.0
50 to 75	100	0.75	75.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	0.75

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
14	310	3.012
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.89	276
Biogeochemical Functions	0.87	268
Plant Community Functions	0.76	237
Habitat Functions	0.92	286

Herbaceous	Function Score	FCU
Hydrology Functions	0.82	253
Biogeochemical Functions	0.82	253
Plant Community Functions	0.00	0
Habitat Functions	0.85	263

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	CF JM
County:	Mingo
Latitude:	37° 43' 42.97"
Longitude:	82° 14' 5.37"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 7 of Right Fork Hell Creek **Assessment Date -** 10/30/07

Impact Area (acres) - 0.06 **Impacted Stream Length (feet) -** 520

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**100**	1.00	100.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**100**	1.00	100.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**0**	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**60**	1.00	60.0
gravel (3/4 to 3 in.)	**20**	0.75	15.0
sand	**15**	0.50	7.5
silt	**15**	0.10	1.5
clay/pavement	**0**	0.00	0.0
		Variable Score	**0.84**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**0**	1.00	0.0
70 to 90	**100**	0.75	75.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**0.75**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**0**	1.00	0.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**100**	0.00	0.0
		Variable Score	**0.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
24	520	3.078
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.89**	**463**
Biogeochemical Functions	**0.89**	**463**
Plant Community Functions	**0.76**	**397**
Habitat Functions	**0.97**	**502**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.82**	**425**
Biogeochemical Functions	**0.82**	**425**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.88**	**456**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	CF JM
County:	Mingo
Latitude:	37° 43' 31.24"
Longitude:	82° 13' 50.89"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 10 of Right Fork Hell Creek **Assessment Date -** 10/29/07

Impact Area (acres) - 0.01 **Impacted Stream Length (feet) -** 335

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**95**	1.00	95.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**5**	0.50	2.5
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.98**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**100**	1.00	100.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**0**	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**93**	1.00	93.0
gravel (3/4 to 3 in.)	**5**	0.75	3.8
sand	**0**	0.50	0.0
silt	**0**	0.10	0.0
clay/pavement	**2**	0.00	0.0
		Variable Score	**0.97**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**10**	1.00	10.0
70 to 90	**90**	0.75	67.5
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**2**	0.00	0.0
		Variable Score	**0.78**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**100**	1.00	100.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
19	335	3.782
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.97**	**327**
Biogeochemical Functions	**0.97**	**327**
Plant Community Functions	**0.95**	**318**
Habitat Functions	**0.97**	**324**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.81**	**272**
Biogeochemical Functions	**0.81**	**270**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.88**	**295**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	CM CF
County:	Mingo
Latitude:	37° 43' 21.37"
Longitude:	82° 13' 57.86"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 11 of Right Fork Hell Creek **Assessment Date -** 10/29/07

Impact Area (acres) - 0.06 **Impacted Stream Length (feet) -** 500

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**94**	1.00	94.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**5**	0.50	2.5
dammed	**0**	0.10	0.0
channelized/straightened	**1**	0.10	0.1
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.97**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**99**	1.00	99.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**1**	0.10	0.1
		Variable Score	**0.99**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**90**	1.00	90.0
gravel (3/4 to 3 in.)	**10**	0.75	7.5
sand	**0**	0.50	0.0
silt	**0**	0.10	0.0
clay/pavement	**0**	0.00	0.0
		Variable Score	**0.98**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**99**	1.00	99.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**1**	0.00	0.0
		Variable Score	**0.99**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**0**	1.00	0.0
70 to 90	**99**	0.75	74.3
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**1**	0.00	0.0
		Variable Score	**0.74**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**99**	1.00	99.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**1**	0.00	0.0
		Variable Score	**0.99**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
19	500	2.534
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.97**	**483**
Biogeochemical Functions	**0.97**	**484**
Plant Community Functions	**0.94**	**469**
Habitat Functions	**0.96**	**479**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.81**	**403**
Biogeochemical Functions	**0.80**	**400**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.88**	**438**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	CF CM
County:	Mingo
Latitude:	37° 43' 13.64"
Longitude:	82° 14' 0.15"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Left Fork Hell Creek **Assessment Date -** 11/1/07

Impact Area (acres) - 0.09 **Impacted Stream Length (feet) -** 870

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**100**	1.00	100.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**96**	1.00	96.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**4**	0.10	0.4
		Variable Score	**0.96**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**25**	1.00	25.0
gravel (3/4 to 3 in.)	**41**	0.75	30.8
sand	**7**	0.50	3.5
silt	**6**	0.10	0.6
clay/pavement	**21**	0.00	0.0
		Variable Score	**0.60**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**98**	1.00	98.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**2**	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**98**	1.00	98.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**2**	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**98**	1.00	98.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**2**	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**98**	1.00	98.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**2**	0.10	0.2
		Variable Score	**0.98**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
24	870	1.840
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
		Variable Score	**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.99**	**859**
Biogeochemical Functions	**0.99**	**862**
Plant Community Functions	**0.99**	**864**
Habitat Functions	**0.96**	**836**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.80**	**700**
Biogeochemical Functions	**0.81**	**705**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.85**	**736**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 43' 23.96"
Longitude:	82° 13' 10.22"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 1 of Left Fork Hell Creek **Assessment Date -** 11/1/07

Impact Area (acres) - 0.22 **Impacted Stream Length (feet) -** 1,430

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**99**	1.00	99.0
restored	**2**	0.75	1.5
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**1**	0.10	0.1
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**1.01**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**99**	1.00	99.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**1**	0.10	0.1
		Variable Score	**0.99**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**33**	1.00	33.0
gravel (3/4 to 3 in.)	**32**	0.75	24.0
sand	**2**	0.50	1.0
silt	**11**	0.10	1.1
clay/pavement	**22**	0.00	0.0
		Variable Score	**0.59**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**99**	1.00	99.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**1**	0.00	0.0
		Variable Score	**0.99**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**99**	1.00	99.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**1**	0.00	0.0
		Variable Score	**0.99**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**99**	1.00	99.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**1**	0.00	0.0
		Variable Score	**0.99**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
36	1430	1.679
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**1.00**	**1425**
Biogeochemical Functions	**1.00**	**1427**
Plant Community Functions	**1.00**	**1429**
Habitat Functions	**0.97**	**1382**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.81**	**1164**
Biogeochemical Functions	**0.82**	**1168**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.85**	**1214**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 43' 20.78"
Longitude:	82° 13' 16.98"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 2 of Unnamed Tributary 1 of Left Fork Hell Creek **Assessment Date -** 11/1/07

Impact Area (acres) - 0.04 **Impacted Stream Length (feet) -** 300

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	70	1.00	70.0
restored	0	0.75	0.0
incised or excess sediment in channel	30	0.50	15.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.85

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	40	1.00	40.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	20	0.10	2.0
clay/pavement	0	0.00	0.0
		Variable Score	0.70

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	85	1.00	85.0
shrub	15	0.75	11.3
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.96

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	60	1.00	60.0
70 to 90	40	0.75	30.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	0	1.00	0.0
20 to 50	0	0.50	0.0
10 to 19	100	0.25	25.0
less than 10	0	0.00	0.0
		Variable Score	0.25

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	20	1.00	20.0
50 to 75	80	0.75	60.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	0.80

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
6	300	1.334
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.88	265
Biogeochemical Functions	0.87	261
Plant Community Functions	0.78	234
Habitat Functions	0.87	261

Herbaceous	Function Score	FCU
Hydrology Functions	0.78	233
Biogeochemical Functions	0.75	225
Plant Community Functions	0.00	0
Habitat Functions	0.79	237

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	CF JM
County:	Mingo
Latitude:	37° 43' 15.10"
Longitude:	82° 13' 34.25"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 5 of Unnamed Tributary 1 of Left Fork Hell Creek **Assessment Date -** 11/1/07

Impact Area (acres) - 0.02 **Impacted Stream Length (feet) -** 200

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	60	1.00	60.0
restored	0	0.75	0.0
incised or excess sediment in channel	35	0.50	17.5
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	5	0.00	0.0
		Variable Score	0.78

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	40	1.00	40.0
gravel (3/4 to 3 in.)	20	0.75	15.0
sand	10	0.50	5.0
silt	30	0.10	3.0
clay/pavement	0	0.00	0.0
		Variable Score	0.63

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	85	1.00	85.0
shrub	15	0.75	11.3
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.96

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	0	1.00	0.0
70 to 90	10	0.75	7.5
50 to 69	80	0.50	40.0
20 to 49	10	0.25	2.5
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	0.50

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	0	1.00	0.0
20 to 50	0	0.50	0.0
10 to 19	100	0.25	25.0
less than 10	0	0.00	0.0
		Variable Score	0.25

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
12	200	4.001
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.83	166
Biogeochemical Functions	0.83	166
Plant Community Functions	0.67	134
Habitat Functions	0.81	162

Herbaceous	Function Score	FCU
Hydrology Functions	0.76	152
Biogeochemical Functions	0.72	143
Plant Community Functions	0.00	0
Habitat Functions	0.75	149

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	CF JM
County:	Mingo
Latitude:	37° 42' 157.98"
Longitude:	82° 13' 39.32"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 10 of Left Fork Hell Creek **Assessment Date -** 11/1/07

Impact Area (acres) - 0.20 **Impacted Stream Length (feet) -** 1,510

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	20	1.00	20.0
restored	0	0.75	0.0
incised or excess sediment in channel	20	0.50	10.0
dammed	10	0.10	1.0
channelized/straightened	50	0.10	5.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.36

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	35	1.00	35.0
gravel (3/4 to 3 in.)	15	0.75	11.3
sand	10	0.50	5.0
silt	5	0.10	0.5
clay/pavement	35	0.00	0.0
		Variable Score	0.52

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	80	1.00	80.0
shrub	20	0.75	15.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.95

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	40	1.00	40.0
70 to 90	30	0.75	22.5
50 to 69	10	0.50	5.0
20 to 49	20	0.25	5.0
10 to 19	10	0.10	1.0
less than 10	0	0.00	0.0
		Variable Score	0.74

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	100	1.00	100.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	65	1.00	65.0
50 to 75	35	0.75	26.3
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	0.91

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
64	1510	2.827
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.75	1134
Biogeochemical Functions	0.75	1130
Plant Community Functions	0.57	865
Habitat Functions	0.55	837

Herbaceous	Function Score	FCU
Hydrology Functions	0.62	943
Biogeochemical Functions	0.49	735
Plant Community Functions	0.00	0
Habitat Functions	0.50	754

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	CF JM
County:	Mingo
Latitude:	37° 42' 43.15"
Longitude:	82° 13' 12.62"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 1 of Unnamed Tributary 10 of Left Fork Hell Creek **Assessment Date -** 11/1/07

Impact Area (acres) - 0.08 **Impacted Stream Length (feet) -** 566

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	60	1.00	60.0
restored	0	0.75	0.0
incised or excess sediment in channel	25	0.50	12.5
dammed	0	0.10	0.0
channelized/straightened	15	0.10	1.5
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.74

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	10	0.75	7.5
sand	10	0.50	5.0
silt	5	0.10	0.5
clay/pavement	50	0.00	0.0
		Variable Score	0.38

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	65	1.00	65.0
shrub	35	0.75	26.3
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.91

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	0	1.00	0.0
70 to 90	10	0.75	7.5
50 to 69	20	0.50	10.0
20 to 49	40	0.25	10.0
10 to 19	30	0.10	3.0
less than 10	0	0.00	0.0
		Variable Score	0.31

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	30	1.00	30.0
20 to 50	50	0.50	25.0
10 to 19	20	0.25	5.0
less than 10	0	0.00	0.0
		Variable Score	0.60

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	15	1.00	15.0
50 to 75	85	0.75	63.8
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	0.79

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
27	566	3.181
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.82	466
Biogeochemical Functions	0.81	460
Plant Community Functions	0.69	388
Habitat Functions	0.74	416

Herbaceous	Function Score	FCU
Hydrology Functions	0.74	419
Biogeochemical Functions	0.69	393
Plant Community Functions	0.00	0
Habitat Functions	0.70	395

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	CF JM
County:	Mingo
Latitude:	37° 42' 38.16"
Longitude:	82° 13' 8.03"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 1 of Unnamed Tributary 1 of UT10 of Left Fork Hell Creek **Assessment Date -** 11/1/07

Impact Area (acres) - 0.04 **Impacted Stream Length (feet) -** 337

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	50	1.00	50.0
restored	0	0.75	0.0
incised or excess sediment in channel	30	0.50	15.0
dammed	0	0.10	0.0
channelized/straightened	20	0.10	2.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.67

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	70	1.00	70.0
gravel (3/4 to 3 in.)	10	0.75	7.5
sand	15	0.50	7.5
silt	0	0.10	0.0
clay/pavement	5	0.00	0.0
		Variable Score	0.85

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	70	1.00	70.0
shrub	30	0.75	22.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.93

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	0	1.00	0.0
70 to 90	60	0.75	45.0
50 to 69	30	0.50	15.0
20 to 49	10	0.25	2.5
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	0.63

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	0	1.00	0.0
20 to 50	70	0.50	35.0
10 to 19	20	0.25	5.0
less than 10	10	0.00	0.0
		Variable Score	0.40

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	60	1.00	60.0
50 to 75	40	0.75	30.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	0.90

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
17	337	3.364
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.82	275
Biogeochemical Functions	0.81	274
Plant Community Functions	0.67	227
Habitat Functions	0.77	259

Herbaceous	Function Score	FCU
Hydrology Functions	0.72	244
Biogeochemical Functions	0.66	223
Plant Community Functions	0.00	0
Habitat Functions	0.71	240

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	CF JM
County:	Mingo
Latitude:	37° 42' 38.84"
Longitude:	82° 13' 4.59"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 2 of Unnamed Tributary 10 of Left Fork Hell Creek **Assessment Date -** 11/1/07

Impact Area (acres) - 0.02 **Impacted Stream Length (feet) -** 360

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	70	1.00	70.0
restored	0	0.75	0.0
incised or excess sediment in channel	20	0.50	10.0
dammed	0	0.10	0.0
channelized/straightened	10	0.10	1.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.81

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	30	1.00	30.0
gravel (3/4 to 3 in.)	40	0.75	30.0
sand	20	0.50	10.0
silt	10	0.10	1.0
clay/pavement	0	0.00	0.0
		Variable Score	0.71

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	80	1.00	80.0
shrub	20	0.75	15.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	2	0.00	0.0
		Variable Score	0.95

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	40	1.00	40.0
70 to 90	60	0.75	45.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	2	0.00	0.0
		Variable Score	0.85

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	0	1.00	0.0
20 to 50	100	0.50	50.0
10 to 19	0	0.25	0.0
less than 10	0	0.00	0.0
		Variable Score	0.50

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
7	360	1.297
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.89	319
Biogeochemical Functions	0.89	321
Plant Community Functions	0.80	287
Habitat Functions	0.86	310

Herbaceous	Function Score	FCU
Hydrology Functions	0.76	275
Biogeochemical Functions	0.73	263
Plant Community Functions	0.00	0
Habitat Functions	0.77	277

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	CF JM
County:	Mingo
Latitude:	37° 42' 22.94"
Longitude:	82° 13' 4.74"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 11 of Left Fork Hell Creek **Assessment Date -** 11/1/07

Impact Area (acres) - 0.13 **Impacted Stream Length (feet) -** 750

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	100	1.00	100.0
restored	0	0.75	0.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	1.00

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	87	1.00	87.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	13	0.25	3.3
less than 5	0	0.10	0.0
		Variable Score	0.90

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	30	1.00	30.0
gravel (3/4 to 3 in.)	28	0.75	21.0
sand	4	0.50	2.0
silt	7	0.10	0.7
clay/pavement	31	0.00	0.0
		Variable Score	0.54

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	100	1.00	100.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	100	1.00	100.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
45	750	4.001
		Variable Score 1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.98	738
Biogeochemical Functions	0.99	744
Plant Community Functions	1.00	750
Habitat Functions	0.96	720

Herbaceous	Function Score	FCU
Hydrology Functions	0.80	597
Biogeochemical Functions	0.81	605
Plant Community Functions	0.00	0
Habitat Functions	0.84	631

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 42' 40.49"
Longitude:	82° 13' 20.60"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 12 of Left Fork Hell Creek **Assessment Date -** 11/1/07

Impact Area (acres) - 0.03 **Impacted Stream Length (feet) -** 305

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**100**	1.00	100.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**90**	1.00	90.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**10**	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**66**	1.00	66.0
gravel (3/4 to 3 in.)	**10**	0.75	7.5
sand	**0**	0.50	0.0
silt	**24**	0.10	2.4
clay/pavement	**0**	0.00	0.0
		Variable Score	**0.76**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**100**	1.00	100.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**100**	1.00	100.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
2	305	0.437
	Variable Score	**0.44**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.91**	**277**
Biogeochemical Functions	**0.94**	**288**
Plant Community Functions	**1.00**	**305**
Habitat Functions	**0.93**	**284**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.73**	**224**
Biogeochemical Functions	**0.68**	**208**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.80**	**244**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 42' 33.44"
Longitude:	82° 13' 22.25"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Pigeonroost Creek **Assessment Date -** 11/1/07

Impact Area (acres) - 0.27 **Impacted Stream Length (feet) -** 1,890

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**100**	1.00	100.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**97**	1.00	97.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**3**	0.10	0.3
		Variable Score	**0.97**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**27**	1.00	27.0
gravel (3/4 to 3 in.)	**20**	0.75	15.0
sand	**5**	0.50	2.5
silt	**15**	0.10	1.5
clay/pavement	**33**	0.00	0.0
		Variable Score	**0.46**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**98**	1.00	98.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**2**	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**100**	1.00	100.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**100**	1.00	100.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
37	1890	1.306
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.99**	**1875**
Biogeochemical Functions	**1.00**	**1883**
Plant Community Functions	**1.00**	**1890**
Habitat Functions	**0.95**	**1800**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.81**	**1525**
Biogeochemical Functions	**0.81**	**1534**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.83**	**1568**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 42' 53.64"
Longitude:	82° 12' 36.53"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 5 of Pigeonroost Creek **Assessment Date -** 11/1/07

Impact Area (acres) - 0.22 **Impacted Stream Length (feet) -** 1,900

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	100	1.00	100.0
restored	0	0.75	0.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	1.00

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	33	1.00	33.0
gravel (3/4 to 3 in.)	27	0.75	20.3
sand	0	0.50	0.0
silt	22	0.10	2.2
clay/pavement	18	0.00	0.0
		Variable Score	0.55

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	98	1.00	98.0
shrub	2	0.75	1.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	98	1.00	98.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	2	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	100	1.00	100.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
144	1900	5.054
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	1.00	1895
Biogeochemical Functions	1.00	1896
Plant Community Functions	1.00	1894
Habitat Functions	0.96	1824

Herbaceous	Function Score	FCU
Hydrology Functions	0.82	1549
Biogeochemical Functions	0.82	1550
Plant Community Functions	0.00	0
Habitat Functions	0.84	1601

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 42' 37.48"
Longitude:	82° 12' 35.09"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Left Fork Pigeonroost Creek **Assessment Date -** 11/1/07

Impact Area (acres) - 0.01 **Impacted Stream Length (feet) -** 140

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	100	1.00	100.0
restored	0	0.75	0.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	1.00

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	60	1.00	60.0
gravel (3/4 to 3 in.)	20	0.75	15.0
sand	10	0.50	5.0
silt	10	0.10	1.0
clay/pavement	0	0.00	0.0
		Variable Score	0.81

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	60	1.00	60.0
shrub	40	0.75	30.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	10	1.00	10.0
70 to 90	80	0.75	60.0
50 to 69	10	0.50	5.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	0.75

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	40	1.00	40.0
20 to 50	10	0.50	5.0
10 to 19	50	0.25	12.5
less than 10	0	0.00	0.0
		Variable Score	0.58

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	20	0.10	2.0
less than 70	80	0.00	0.0
		Variable Score	0.02

Number of Native Species (*COMP*)

# of species	Score
5	1.00
Variable Score	1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	0	1.00	0.0
50 to 75	100	0.75	75.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	0.75

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
4	140	1.905
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.92	129
Biogeochemical Functions	0.91	127
Plant Community Functions	0.88	123
Habitat Functions	0.93	130

Herbaceous	Function Score	FCU
Hydrology Functions	0.80	112
Biogeochemical Functions	0.81	113
Plant Community Functions	0.14	20
Habitat Functions	0.86	121

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 42' 38.75"
Longitude:	82° 11' 58.97"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary of Pigeon Creek **Assessment Date -** 10/29/07

Impact Area (acres) - 0.12 **Impacted Stream Length (feet) -** 1,330

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**85**	1.00	85.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**15**	0.50	7.5
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.93**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**97**	1.00	97.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**3**	0.10	0.3
		Variable Score	**0.97**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**50**	1.00	50.0
gravel (3/4 to 3 in.)	**10**	0.75	7.5
sand	**0**	0.50	0.0
silt	**0**	0.10	0.0
clay/pavement	**40**	0.00	0.0
		Variable Score	**0.58**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**90**	1.00	90.0
70 to 90	**0**	0.75	0.0
50 to 69	**10**	0.50	5.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**0.95**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**100**	1.00	100.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
59	1330	2.958
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.97**	**1293**
Biogeochemical Functions	**0.97**	**1296**
Plant Community Functions	**0.95**	**1268**
Habitat Functions	**0.92**	**1227**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.80**	**1058**
Biogeochemical Functions	**0.78**	**1041**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.81**	**1082**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 44' 38.78"
Longitude:	82° 12' 30.11"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary of Stonecoal Branch **Assessment Date -** 10/31/07

Impact Area (acres) - 0.01 **Impacted Stream Length (feet) -** 100

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**90**	1.00	90.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**10**	0.50	5.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.95**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**100**	1.00	100.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**0**	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**60**	1.00	60.0
gravel (3/4 to 3 in.)	**10**	0.75	7.5
sand	**20**	0.50	10.0
silt	**10**	0.10	1.0
clay/pavement	**0**	0.00	0.0
		Variable Score	**0.79**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**70**	1.00	70.0
shrub	**30**	0.75	22.5
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**0.93**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**0**	1.00	0.0
70 to 90	**60**	0.75	45.0
50 to 69	**40**	0.50	20.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**0.65**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**0**	1.00	0.0
20 to 50	**0**	0.50	0.0
10 to 19	**85**	0.25	21.3
less than 10	**15**	0.00	0.0
		Variable Score	**0.21**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**100**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**0**	1.00	0.0
50 to 75	**100**	0.75	75.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**0.75**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
5	100	3.335
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.87**	**87**
Biogeochemical Functions	**0.86**	**86**
Plant Community Functions	**0.77**	**77**
Habitat Functions	**0.90**	**90**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.79**	**79**
Biogeochemical Functions	**0.79**	**79**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.84**	**84**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	JM, CF
County:	Mingo
Latitude:	37° 42' 24.85"
Longitude:	82° 12' 4.74"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 4 of Miller Creek **Assessment Date -** 10/29/07

Impact Area (acres) - 0.01 **Impacted Stream Length (feet) -** 132

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**97**	1.00	97.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**3**	0.10	0.3
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.97**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**96**	1.00	96.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**4**	0.10	0.4
		Variable Score	**0.96**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**45**	1.00	45.0
gravel (3/4 to 3 in.)	**35**	0.75	26.3
sand	**0**	0.50	0.0
silt	**20**	0.10	2.0
clay/pavement	**0**	0.00	0.0
		Variable Score	**0.73**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**96**	1.00	96.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**4**	0.00	0.0
		Variable Score	**0.96**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**96**	1.00	96.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**4**	0.00	0.0
		Variable Score	**0.96**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**96**	1.00	96.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**4**	0.00	0.0
		Variable Score	**0.96**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
6	132	3.031
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
		Variable Score	**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.97**	**129**
Biogeochemical Functions	**0.98**	**129**
Plant Community Functions	**0.97**	**128**
Habitat Functions	**0.96**	**126**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.80**	**105**
Biogeochemical Functions	**0.80**	**105**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.85**	**112**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 44' 32.48"
Longitude:	82° 15' 17.43"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 5 of Miller Creek **Assessment Date -** 10/29/07

Impact Area (acres) - 0.35 **Impacted Stream Length (feet) -** 888

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**95**	1.00	95.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**5**	0.10	0.5
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.96**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**95**	1.00	95.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**5**	0.10	0.5
		Variable Score	**0.96**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**45**	1.00	45.0
gravel (3/4 to 3 in.)	**30**	0.75	22.5
sand	**13**	0.50	6.5
silt	**0**	0.10	0.0
clay/pavement	**12**	0.00	0.0
		Variable Score	**0.74**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**95**	1.00	95.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**5**	0.00	0.0
		Variable Score	**0.95**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**95**	1.00	95.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**5**	0.00	0.0
		Variable Score	**0.95**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**95**	1.00	95.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**5**	0.00	0.0
		Variable Score	**0.95**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**95**	1.00	95.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**5**	0.10	0.5
		Variable Score	**0.96**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
50	888	3.755
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**98**	1.00	98.0
2 to 4% slope with common step pools	**2**	0.50	1.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**0.99**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.96**	**855**
Biogeochemical Functions	**0.97**	**858**
Plant Community Functions	**0.96**	**853**
Habitat Functions	**0.94**	**837**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.79**	**699**
Biogeochemical Functions	**0.78**	**697**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.84**	**744**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 44' 19.32"
Longitude:	82° 14' 43.06"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

PROPOSED TEMPORARY IMPACT CHANNELS

Site Name - Unnamed Tributary 3 of Ruth Trace Branch Pre **Assessment Date -** 8/1/08

Impact Area (acres) - 0.01 **Impacted Stream Length (feet) -** 65

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**100**	1.00	100.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**100**	1.00	100.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**0**	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**48**	1.00	48.0
gravel (3/4 to 3 in.)	**36**	0.75	27.0
sand	**0**	0.50	0.0
silt	**16**	0.10	1.6
clay/pavement	**0**	0.00	0.0
		Variable Score	**0.77**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**100**	1.00	100.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**100**	1.00	100.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
4	65	4.104
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**1.00**	**65**
Biogeochemical Functions	**1.00**	**65**
Plant Community Functions	**1.00**	**65**
Habitat Functions	**0.98**	**64**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.82**	**53**
Biogeochemical Functions	**0.82**	**53**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.87**	**56**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 45' 50.84"
Longitude:	82° 14' 52.22"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 8 of Ruth Trace Branch Pre **Assessment Date -** 8/1/08

Impact Area (acres) - 0.01 **Impacted Stream Length (feet) -** 130

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**100**	1.00	100.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**100**	1.00	100.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**0**	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**70**	1.00	70.0
gravel (3/4 to 3 in.)	**10**	0.75	7.5
sand	**0**	0.50	0.0
silt	**20**	0.10	2.0
clay/pavement	**0**	0.00	0.0
		Variable Score	**0.80**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**100**	1.00	100.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**100**	1.00	100.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
23	130	11.799
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**1.00**	**130**
Biogeochemical Functions	**1.00**	**130**
Plant Community Functions	**1.00**	**130**
Habitat Functions	**0.98**	**128**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.82**	**106**
Biogeochemical Functions	**0.82**	**106**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.87**	**113**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 45' 33.60"
Longitude:	82° 14' 57.80"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 1 of Unnamed Tributary 1 of RFCB Crossing Pre **Assessment Date -** 8/1/08

Impact Area (acres) - 0.00 **Impacted Stream Length (feet) -** 55

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	100	1.00	100.0
restored	0	0.75	0.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	1.00

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	3	0.75	2.3
10 to 19	2	0.50	1.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	5	0.10	0.5
		Variable Score	0.94

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	33	1.00	33.0
gravel (3/4 to 3 in.)	32	0.75	24.0
sand	0	0.50	0.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.57

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	100	1.00	100.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	100	1.00	100.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
1	55	1.213
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.99	54
Biogeochemical Functions	0.99	55
Plant Community Functions	1.00	55
Habitat Functions	0.96	53

Herbaceous	Function Score	FCU
Hydrology Functions	0.80	44
Biogeochemical Functions	0.81	45
Plant Community Functions	0.00	0
Habitat Functions	0.84	46

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 44' 44.28"
Longitude:	82° 14' 20.37"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 1 of Unnamed Tributary 1 of RFCB Pond 3 Pre **Assessment Date -** 8/1/08

Impact Area (acres) - 0.00 **Impacted Stream Length (feet) -** 45

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**100**	1.00	100.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**90**	1.00	90.0
(20 to 29) or (46 to 65)	**3**	0.75	2.3
10 to 19	**2**	0.50	1.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**5**	0.10	0.5
		Variable Score	**0.94**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**33**	1.00	33.0
gravel (3/4 to 3 in.)	**32**	0.75	24.0
sand	**0**	0.50	0.0
silt	**0**	0.10	0.0
clay/pavement	**35**	0.00	0.0
		Variable Score	**0.57**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**100**	1.00	100.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**100**	1.00	100.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
2	45	2.964
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.99**	**45**
Biogeochemical Functions	**0.99**	**45**
Plant Community Functions	**1.00**	**45**
Habitat Functions	**0.96**	**43**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.80**	**36**
Biogeochemical Functions	**0.81**	**36**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.84**	**38**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 44' 44.28"
Longitude:	82° 14' 20.37"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 2 of Right Fork Conley Branch Pre **Assessment Date -** 8/1/08

Impact Area (acres) - 0.01 **Impacted Stream Length (feet) -** 180

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**100**	1.00	100.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**100**	1.00	100.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**0**	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**31**	1.00	31.0
gravel (3/4 to 3 in.)	**22**	0.75	16.5
sand	**0**	0.50	0.0
silt	**5**	0.10	0.5
clay/pavement	**42**	0.00	0.0
		Variable Score	**0.48**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**100**	1.00	100.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**100**	1.00	100.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
6	180	2.223
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**1.00**	**180**
Biogeochemical Functions	**1.00**	**180**
Plant Community Functions	**1.00**	**180**
Habitat Functions	**0.96**	**172**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.82**	**147**
Biogeochemical Functions	**0.82**	**147**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.83**	**150**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 44' 53.01"
Longitude:	82° 14' 40.42"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Left Fork Conley Branch Pre **Assessment Date -** 8/1/08

Impact Area (acres) - 0.08 **Impacted Stream Length (feet) -** 585

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**100**	1.00	100.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**98**	1.00	98.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**2**	0.10	0.2
		Variable Score	**0.98**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**30**	1.00	30.0
gravel (3/4 to 3 in.)	**33**	0.75	24.8
sand	**0**	0.50	0.0
silt	**17**	0.10	1.7
clay/pavement	**20**	0.00	0.0
		Variable Score	**0.56**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**98**	1.00	98.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**2**	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**98**	1.00	98.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**2**	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
17	585	1.938
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.99**	**581**
Biogeochemical Functions	**1.00**	**582**
Plant Community Functions	**0.99**	**581**
Habitat Functions	**0.96**	**562**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.81**	**475**
Biogeochemical Functions	**0.81**	**477**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.84**	**494**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 45' 18.31"
Longitude:	82° 14' 5.35"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 4 of Right Fork Hell Creek Pre **Assessment Date -** 8/1/08

Impact Area (acres) - 0.02 **Impacted Stream Length (feet) -** 455

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	90	1.00	90.0
restored	0	0.75	0.0
incised or excess sediment in channel	10	0.50	5.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.95

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	50	1.00	50.0
gravel (3/4 to 3 in.)	20	0.75	15.0
sand	10	0.50	5.0
silt	5	0.10	0.5
clay/pavement	15	0.00	0.0
		Variable Score	0.71

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	0	1.00	0.0
70 to 90	90	0.75	67.5
50 to 69	10	0.50	5.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	0.73

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	0	1.00	0.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	100	0.00	0.0
		Variable Score	0.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	80	1.00	80.0
50 to 75	0	0.75	0.0
25 to 49	15	0.50	7.5
10 to 24	0	0.25	0.0
less than 10	5	0.10	0.5
		Variable Score	0.88

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
12	455	1.759
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.88	399
Biogeochemical Functions	0.86	394
Plant Community Functions	0.74	336
Habitat Functions	0.92	417

Herbaceous	Function Score	FCU
Hydrology Functions	0.81	367
Biogeochemical Functions	0.80	362
Plant Community Functions	0.00	0
Habitat Functions	0.84	382

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	CF JM
County:	Mingo
Latitude:	37° 43' 48.24"
Longitude:	82° 13' 50.04"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 1 of Unnamed Tributary 4 of Right Fork Hell Creek **Assessment Date -** 10/30/07

Impact Area (acres) - 0.01 **Impacted Stream Length (feet) -** 90

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**100**	1.00	100.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**100**	1.00	100.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**0**	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**60**	1.00	60.0
gravel (3/4 to 3 in.)	**20**	0.75	15.0
sand	**5**	0.50	2.5
silt	**5**	0.10	0.5
clay/pavement	**10**	0.00	0.0
		Variable Score	**0.78**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**0**	1.00	0.0
70 to 90	**70**	0.75	52.5
50 to 69	**10**	0.50	5.0
20 to 49	**20**	0.25	5.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**0.63**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**0**	1.00	0.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**100**	0.00	0.0
		Variable Score	**0.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**90**	1.00	90.0
50 to 75	**0**	0.75	0.0
25 to 49	**10**	0.50	5.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**0.95**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
39	90	28.899
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.88**	**79**
Biogeochemical Functions	**0.87**	**79**
Plant Community Functions	**0.74**	**66**
Habitat Functions	**0.94**	**85**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.82**	**73**
Biogeochemical Functions	**0.82**	**73**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.87**	**78**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	CF JM
County:	Mingo
Latitude:	37° 43' 47.81"
Longitude:	82° 13' 56.13"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 5 of Right Fork Hell Creek IUAR8 Crossing Pre **Assessment Date -** 8/1/08

Impact Area (acres) - 0.00 **Impacted Stream Length (feet) -** 25

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	100	1.00	100.0
restored	0	0.75	0.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	1.00

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	60	1.00	60.0
gravel (3/4 to 3 in.)	20	0.75	15.0
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	10	0.00	0.0
		Variable Score	0.80

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	0	1.00	0.0
70 to 90	100	0.75	75.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	0.75

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	0	1.00	0.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	100	0.00	0.0
		Variable Score	0.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
3	25	8.003
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.89	22
Biogeochemical Functions	0.89	22
Plant Community Functions	0.76	19
Habitat Functions	0.96	24

Herbaceous	Function Score	FCU
Hydrology Functions	0.82	20
Biogeochemical Functions	0.82	20
Plant Community Functions	0.00	0
Habitat Functions	0.87	22

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	CF JM
County:	Mingo
Latitude:	37° 43' 38.71"
Longitude:	82° 13' 45.87"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 5 of Right Fork Hell Creek Pond 8b Pre **Assessment Date -** 8/1/08

Impact Area (acres) - 0.01 **Impacted Stream Length (feet) -** 75

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	100	1.00	100.0
restored	0	0.75	0.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	1.00

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	60	1.00	60.0
gravel (3/4 to 3 in.)	20	0.75	15.0
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	10	0.00	0.0
		Variable Score	0.80

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	0	1.00	0.0
70 to 90	100	0.75	75.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	0.75

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	0	1.00	0.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	100	0.00	0.0
		Variable Score	0.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
6	75	5.335
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.89	67
Biogeochemical Functions	0.89	67
Plant Community Functions	0.76	57
Habitat Functions	0.96	72

Herbaceous	Function Score	FCU
Hydrology Functions	0.82	61
Biogeochemical Functions	0.82	61
Plant Community Functions	0.00	0
Habitat Functions	0.87	65

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	CF JM
County:	Mingo
Latitude:	37° 43' 38.71"
Longitude:	82° 13' 45.87"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 6 of Right Fork Hell Creek IUAR8 crossing Pre **Assessment Date -** 8/1/08

Impact Area (acres) - 0.00 **Impacted Stream Length (feet) -** 15

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**100**	1.00	100.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**100**	1.00	100.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**0**	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**65**	1.00	65.0
gravel (3/4 to 3 in.)	**20**	0.75	15.0
sand	**10**	0.50	5.0
silt	**5**	0.10	0.5
clay/pavement	**0**	0.00	0.0
		Variable Score	**0.86**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**0**	1.00	0.0
70 to 90	**90**	0.75	67.5
50 to 69	**10**	0.50	5.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**0.73**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**0**	1.00	0.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**100**	0.00	0.0
		Variable Score	**0.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**0**	1.00	0.0
50 to 75	**100**	0.75	75.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**0.75**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
3	15	13.338
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.89**	**13**
Biogeochemical Functions	**0.86**	**13**
Plant Community Functions	**0.76**	**11**
Habitat Functions	**0.94**	**14**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.82**	**12**
Biogeochemical Functions	**0.82**	**12**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.88**	**13**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	CF CM
County:	Mingo
Latitude:	37° 43' 37.87"
Longitude:	82° 13' 46.03"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 6 of Right Fork Hell Creek Pond 8B Pre **Assessment Date -** 8/1/08

Impact Area (acres) - 0.01 **Impacted Stream Length (feet) -** 85

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**100**	1.00	100.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**100**	1.00	100.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**0**	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**65**	1.00	65.0
gravel (3/4 to 3 in.)	**20**	0.75	15.0
sand	**10**	0.50	5.0
silt	**5**	0.10	0.5
clay/pavement	**0**	0.00	0.0
		Variable Score	**0.86**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**0**	1.00	0.0
70 to 90	**90**	0.75	67.5
50 to 69	**10**	0.50	5.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**0.73**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**0**	1.00	0.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**100**	0.00	0.0
		Variable Score	**0.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**0**	1.00	0.0
50 to 75	**100**	0.75	75.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**0.75**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
48	85	37.660
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
		Variable Score	**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.89**	**75**
Biogeochemical Functions	**0.86**	**73**
Plant Community Functions	**0.76**	**64**
Habitat Functions	**0.94**	**80**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.82**	**69**
Biogeochemical Functions	**0.82**	**69**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.88**	**75**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	CF CM
County:	Mingo
Latitude:	37° 43' 37.87"
Longitude:	82° 13' 46.03"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 1 of Unnamed Tributary 1 of Pigeonroost Creek Pre **Assessment Date -** 8/1/08

Impact Area (acres) - 0.00 **Impacted Stream Length (feet) -** 55

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	100	1.00	100.0
restored	0	0.75	0.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	1.00

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	68	1.00	68.0
gravel (3/4 to 3 in.)	18	0.75	13.5
sand	1	0.50	0.5
silt	13	0.10	1.3
clay/pavement	0	0.00	0.0
		Variable Score	0.83

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	100	1.00	100.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	100	1.00	100.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
Variable Score	1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
2	55	2.425
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	1.00	55
Biogeochemical Functions	1.00	55
Plant Community Functions	1.00	55
Habitat Functions	0.99	54

Herbaceous	Function Score	FCU
Hydrology Functions	0.82	45
Biogeochemical Functions	0.82	45
Plant Community Functions	0.00	0
Habitat Functions	0.88	48

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 43' 7.64"
Longitude:	82° 12' 37.99"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 2 of Pigeonroost Creek IUAR11 Crossing Pre **Assessment Date -** 8/1/08

Impact Area (acres) - 0.02 **Impacted Stream Length (feet) -** 122

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	70	1.00	70.0
restored	0	0.75	0.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	30	0.10	3.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.73

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	97	1.00	97.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	3	0.10	0.3
		Variable Score	0.97

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	66	1.00	66.0
gravel (3/4 to 3 in.)	14	0.75	10.5
sand	0	0.50	0.0
silt	20	0.10	2.0
clay/pavement	0	0.00	0.0
		Variable Score	0.79

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	99	1.00	99.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	1	0.00	0.0
		Variable Score	0.99

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	99	1.00	99.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	1	0.00	0.0
		Variable Score	0.99

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	100	1.00	100.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
Variable Score	1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
0	122	0.000
	Variable Score	0.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.77	94
Biogeochemical Functions	0.84	102
Plant Community Functions	0.85	104
Habitat Functions	0.76	93

Herbaceous	Function Score	FCU
Hydrology Functions	0.63	77
Biogeochemical Functions	0.49	60
Plant Community Functions	0.00	0
Habitat Functions	0.64	78

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 42' 51.98"
Longitude:	82° 12' 36.44"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 2 of Pigeonroost Creek Pond 11 Pre **Assessment Date -** 8/1/08

Impact Area (acres) - 0.01 **Impacted Stream Length (feet) -** 37

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	70	1.00	70.0
restored	0	0.75	0.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	30	0.10	3.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.73

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	97	1.00	97.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	3	0.10	0.3
		Variable Score	0.97

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	66	1.00	66.0
gravel (3/4 to 3 in.)	14	0.75	10.5
sand	0	0.50	0.0
silt	20	0.10	2.0
clay/pavement	0	0.00	0.0
		Variable Score	0.79

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	99	1.00	99.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	1	0.00	0.0
		Variable Score	0.99

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	99	1.00	99.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	1	0.00	0.0
		Variable Score	0.99

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	100	1.00	100.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
Variable Score	1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
1	37	1.802
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.92	34
Biogeochemical Functions	0.92	34
Plant Community Functions	0.85	32
Habitat Functions	0.84	31

Herbaceous	Function Score	FCU
Hydrology Functions	0.75	28
Biogeochemical Functions	0.69	26
Plant Community Functions	0.00	0
Habitat Functions	0.74	27

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 42' 51.98"
Longitude:	82° 12' 36.44"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 3 of Pigeonroost Creek **Assessment Date -** 11/1/07

Impact Area (acres) - 0.02 **Impacted Stream Length (feet) -** 117

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**100**	1.00	100.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**100**	1.00	100.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**0**	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**38**	1.00	38.0
gravel (3/4 to 3 in.)	**23**	0.75	17.3
sand	**0**	0.50	0.0
silt	**39**	0.10	3.9
clay/pavement	**0**	0.00	0.0
		Variable Score	**0.59**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**100**	1.00	100.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**100**	1.00	100.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
4	117	2.280
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**1.00**	**117**
Biogeochemical Functions	**1.00**	**117**
Plant Community Functions	**1.00**	**117**
Habitat Functions	**0.97**	**113**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.82**	**96**
Biogeochemical Functions	**0.82**	**96**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.85**	**99**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 42' 47.94"
Longitude:	82° 12' 36.98"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary of Pigeon Creek **Assessment Date -** 10/29/07

Impact Area (acres) - 0.12 **Impacted Stream Length (feet) -** 552

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**85**	1.00	85.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**15**	0.50	7.5
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.93**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**97**	1.00	97.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**3**	0.10	0.3
		Variable Score	**0.97**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**50**	1.00	50.0
gravel (3/4 to 3 in.)	**10**	0.75	7.5
sand	**0**	0.50	0.0
silt	**0**	0.10	0.0
clay/pavement	**40**	0.00	0.0
		Variable Score	**0.58**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**90**	1.00	90.0
70 to 90	**0**	0.75	0.0
50 to 69	**10**	0.50	5.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**0.95**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**100**	1.00	100.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
59	552	7.128
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.97**	**537**
Biogeochemical Functions	**0.97**	**538**
Plant Community Functions	**0.95**	**526**
Habitat Functions	**0.92**	**509**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.80**	**439**
Biogeochemical Functions	**0.78**	**432**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.81**	**449**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 44' 38.78"
Longitude:	82° 12' 30.11"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 6 of Unnamed Tributary of Pigeon Creek Crossing 1 Pre **Assessment Date -** 8/1/08

Impact Area (acres) - 0.01 **Impacted Stream Length (feet) -** 55

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	97	1.00	97.0
restored	0	0.75	0.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	3	0.10	0.3
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.97

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	97	1.00	97.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	3	0.10	0.3
		Variable Score	0.97

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	55	1.00	55.0
gravel (3/4 to 3 in.)	40	0.75	30.0
sand	0	0.50	0.0
silt	3	0.10	0.3
clay/pavement	2	0.00	0.0
		Variable Score	0.85

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	100	1.00	100.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	100	1.00	100.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
3	55	3.638
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.99	54
Biogeochemical Functions	0.99	55
Plant Community Functions	0.99	54
Habitat Functions	0.97	54

Herbaceous	Function Score	FCU
Hydrology Functions	0.81	44
Biogeochemical Functions	0.80	44
Plant Community Functions	0.00	0
Habitat Functions	0.87	48

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 44' 38.78"
Longitude:	82° 12' 30.11"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 6 of Unnamed Tributary of Pigeon Creek Crossing 2 Pre **Assessment Date -** 8/1/08

Impact Area (acres) - 0.00 **Impacted Stream Length (feet) -** 40

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	97	1.00	97.0
restored	0	0.75	0.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	3	0.10	0.3
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.97

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	97	1.00	97.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	3	0.10	0.3
		Variable Score	0.97

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	55	1.00	55.0
gravel (3/4 to 3 in.)	40	0.75	30.0
sand	0	0.50	0.0
silt	3	0.10	0.3
clay/pavement	2	0.00	0.0
		Variable Score	0.85

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	100	1.00	100.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	100	1.00	100.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
3	40	5.002
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.99	40
Biogeochemical Functions	0.99	40
Plant Community Functions	0.99	39
Habitat Functions	0.97	39

Herbaceous	Function Score	FCU
Hydrology Functions	0.81	32
Biogeochemical Functions	0.80	32
Plant Community Functions	0.00	0
Habitat Functions	0.87	35

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	RE, AC
County:	Mingo
Latitude:	37° 44' 38.78"
Longitude:	82° 12' 30.11"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

PROPOSED MITIGATION CHANNELS

ON-SITE RESTORATION

Site Name - Unnamed Tributary 3 of Ruth Trace Branch Post **Assessment Date -** 8/11/08

Impact Area (acres) - 0.01 **Impacted Stream Length (feet) -** 65

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	0	1.00	0.0
restored	100	0.75	75.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	**0.75**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	48	1.00	48.0
gravel (3/4 to 3 in.)	36	0.75	27.0
sand	0	0.50	0.0
silt	16	0.10	1.6
clay/pavement	0	0.00	0.0
		Variable Score	**0.77**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	100	1.00	100.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	100	1.00	100.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	0	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
2	65	2.052
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.93	60
Biogeochemical Functions	0.93	60
Plant Community Functions	0.87	56
Habitat Functions	0.85	55

Herbaceous	Function Score	FCU
Hydrology Functions	0.76	49
Biogeochemical Functions	0.71	46
Plant Community Functions	0.00	0
Habitat Functions	0.75	49

NOTE: percentages entered for each variable must sum to 100

Site Name - Unnamed Tributary 8 of Ruth Trace Branch Post **Assessment Date -** 8/11/08

Impact Area (acres) - 0.01 **Impacted Stream Length (feet) -** 130

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**0**	1.00	0.0
restored	**100**	0.75	75.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.75**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**100**	1.00	100.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**0**	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**70**	1.00	70.0
gravel (3/4 to 3 in.)	**10**	0.75	7.5
sand	**0**	0.50	0.0
silt	**20**	0.10	2.0
clay/pavement	**0**	0.00	0.0
		Variable Score	**0.80**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**100**	1.00	100.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**100**	1.00	100.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
4	130	2.052
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.93**	**121**
Biogeochemical Functions	**0.93**	**121**
Plant Community Functions	**0.87**	**113**
Habitat Functions	**0.85**	**111**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.76**	**99**
Biogeochemical Functions	**0.71**	**92**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.75**	**98**

NOTE: percentages entered for each variable must sum to 100

Site Name - Unnamed Tributary 1 of Unnamed Tributary 1 of RFCB Crossing Post **Assessment Date -** 8/11/08

Impact Area (acres) - 0.00 **Impacted Stream Length (feet) -** 55

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	0	1.00	0.0
restored	100	0.75	75.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	**0.75**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	3	0.75	2.3
10 to 19	2	0.50	1.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	5	0.10	0.5
		Variable Score	**0.94**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	33	1.00	33.0
gravel (3/4 to 3 in.)	32	0.75	24.0
sand	0	0.50	0.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	**0.57**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	100	1.00	100.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	100	1.00	100.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	0	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
1	55	1.213
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.92**	**51**
Biogeochemical Functions	**0.93**	**51**
Plant Community Functions	**0.87**	**48**
Habitat Functions	**0.83**	**46**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.75**	**41**
Biogeochemical Functions	**0.70**	**39**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.73**	**40**

NOTE: percentages entered for each variable must sum to 100

Site Name - Unnamed Tributary 1 of Unnamed Tributary 1 of RFCB Pond 3 Post **Assessment Date -** 8/11/08

Impact Area (acres) - 0.00 **Impacted Stream Length (feet) -** 45

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	100	0.75	75.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.75

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	3	0.75	2.3
10 to 19	2	0.50	1.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	5	0.10	0.5
		Variable Score	0.94

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	33	1.00	33.0
gravel (3/4 to 3 in.)	32	0.75	24.0
sand	0	0.50	0.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.57

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	100	1.00	100.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	100	1.00	100.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
2	45	2.964
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.92	41
Biogeochemical Functions	0.93	42
Plant Community Functions	0.87	39
Habitat Functions	0.83	38

Herbaceous	Function Score	FCU
Hydrology Functions	0.75	34
Biogeochemical Functions	0.70	32
Plant Community Functions	0.00	0
Habitat Functions	0.73	33

NOTE: percentages entered for each variable must sum to 100

Site Name - Unnamed Tributary 2 of Right Fork Conley Branch Post **Assessment Date -** 8/11/08

Impact Area (acres) - 0.01 **Impacted Stream Length (feet) -** 180

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	0	1.00	0.0
restored	100	0.75	75.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	**0.75**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	31	1.00	31.0
gravel (3/4 to 3 in.)	22	0.75	16.5
sand	0	0.50	0.0
silt	5	0.10	0.5
clay/pavement	42	0.00	0.0
		Variable Score	**0.48**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	100	1.00	100.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	100	1.00	100.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	0	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
3	180	1.112
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.93	168
Biogeochemical Functions	0.93	168
Plant Community Functions	0.87	156
Habitat Functions	0.83	149

Herbaceous	Function Score	FCU
Hydrology Functions	0.76	137
Biogeochemical Functions	0.71	127
Plant Community Functions	0.00	0
Habitat Functions	0.72	130

NOTE: percentages entered for each variable must sum to 100

Site Name - Left Fork Conley Branch Post **Assessment Date -** 8/11/08

Impact Area (acres) - 0.08 **Impacted Stream Length (feet) -** 585

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	0	1.00	0.0
restored	100	0.75	75.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	**0.75**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	98	1.00	98.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	2	0.10	0.2
		Variable Score	**0.98**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	30	1.00	30.0
gravel (3/4 to 3 in.)	33	0.75	24.8
sand	0	0.50	0.0
silt	17	0.10	1.7
clay/pavement	20	0.00	0.0
		Variable Score	**0.56**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	98	1.00	98.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	2	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	98	1.00	98.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	2	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
9	585	1.026
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.92	541
Biogeochemical Functions	0.93	542
Plant Community Functions	0.86	503
Habitat Functions	0.83	487

Herbaceous	Function Score	FCU
Hydrology Functions	0.76	442
Biogeochemical Functions	0.71	413
Plant Community Functions	0.00	0
Habitat Functions	0.73	428

NOTE: percentages entered for each variable must sum to 100

Site Name - Unnamed Tributary 4 of Right Fork Hell Creek Post **Assessment Date -** 8/11/08

Impact Area (acres) - 0.02 **Impacted Stream Length (feet) -** 455

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**0**	1.00	0.0
restored	**100**	0.75	75.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.75**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**100**	1.00	100.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**0**	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**50**	1.00	50.0
gravel (3/4 to 3 in.)	**20**	0.75	15.0
sand	**10**	0.50	5.0
silt	**5**	0.10	0.5
clay/pavement	**15**	0.00	0.0
		Variable Score	**0.71**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**0**	1.00	0.0
70 to 90	**90**	0.75	67.5
50 to 69	**10**	0.50	5.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**0.73**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**0**	1.00	0.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**100**	0.00	0.0
		Variable Score	**0.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**80**	1.00	80.0
50 to 75	**0**	0.75	0.0
25 to 49	**15**	0.50	7.5
10 to 24	**0**	0.25	0.0
less than 10	**5**	0.10	0.5
		Variable Score	**0.88**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
16	455	2.345
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.83**	**376**
Biogeochemical Functions	**0.82**	**371**
Plant Community Functions	**0.66**	**299**
Habitat Functions	**0.81**	**371**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.76**	**346**
Biogeochemical Functions	**0.71**	**322**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.75**	**339**

NOTE: percentages entered for each variable must sum to 100

Site Name - Unnamed Tributary 1 of Unnamed Tributary 4 of Right Fork Hell Creek Post **Assessment Date -** 10/30/07

Impact Area (acres) - 0.01 **Impacted Stream Length (feet) -** 90

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**0**	1.00	0.0
restored	**100**	0.75	75.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.75**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**97**	1.00	97.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**3**	0.10	0.3
		Variable Score	**0.97**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**66**	1.00	66.0
gravel (3/4 to 3 in.)	**14**	0.75	10.5
sand	**0**	0.50	0.0
silt	**20**	0.10	2.0
clay/pavement	**0**	0.00	0.0
		Variable Score	**0.79**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**0**	1.00	0.0
70 to 90	**70**	0.75	52.5
50 to 69	**10**	0.50	5.0
20 to 49	**20**	0.25	5.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**0.63**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**0**	1.00	0.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**100**	0.00	0.0
		Variable Score	**0.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**90**	1.00	90.0
50 to 75	**0**	0.75	0.0
25 to 49	**10**	0.50	5.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**0.95**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
5	90	3.705
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
		Variable Score	**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.81**	**73**
Biogeochemical Functions	**0.81**	**73**
Plant Community Functions	**0.64**	**57**
Habitat Functions	**0.82**	**74**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.75**	**68**
Biogeochemical Functions	**0.70**	**63**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.75**	**68**

NOTE: percentages entered for each variable must sum to 100

Site Name - Unnamed Tributary 5 of Right Fork Hell Creek IUAR8 Crossing Post **Assessment Date -** 8/11/08

Impact Area (acres) - 0.00 **Impacted Stream Length (feet) -** 25

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	100	0.75	75.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.75

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	60	1.00	60.0
gravel (3/4 to 3 in.)	20	0.75	15.0
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	10	0.00	0.0
		Variable Score	0.80

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	0	1.00	0.0
70 to 90	100	0.75	75.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	0.75

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	0	1.00	0.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	100	0.00	0.0
		Variable Score	0.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
Variable Score	1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
1	25	2.668
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.83	21
Biogeochemical Functions	0.83	21
Plant Community Functions	0.66	17
Habitat Functions	0.83	21

Herbaceous	Function Score	FCU
Hydrology Functions	0.76	19
Biogeochemical Functions	0.71	18
Plant Community Functions	0.00	0
Habitat Functions	0.75	19

NOTE: percentages entered for each variable must sum to 100

Site Name - Unnamed Tributary 5 of Right Fork Hell Creek Pond 8b Post Assessment Date - 8/11/08

Impact Area (acres) - 0.01 Impacted Stream Length (feet) - 75

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	100	0.75	75.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.75

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	60	1.00	60.0
gravel (3/4 to 3 in.)	20	0.75	15.0
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	10	0.00	0.0
		Variable Score	0.80

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	0	1.00	0.0
70 to 90	100	0.75	75.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	0.75

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	0	1.00	0.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	100	0.00	0.0
		Variable Score	0.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
Variable Score	1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
2	75	1.778
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.83	62
Biogeochemical Functions	0.83	62
Plant Community Functions	0.66	50
Habitat Functions	0.83	62

Herbaceous	Function Score	FCU
Hydrology Functions	0.76	57
Biogeochemical Functions	0.71	53
Plant Community Functions	0.00	0
Habitat Functions	0.75	57

NOTE: percentages entered for each variable must sum to 100

Site Name - Unnamed Tributary 6 of Right Fork Hell Creek IUAR8 crossing Post **Assessment Date -** 8/11/08

Impact Area (acres) - 0.00 **Impacted Stream Length (feet) -** 15

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	100	0.75	75.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.75

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	65	1.00	65.0
gravel (3/4 to 3 in.)	20	0.75	15.0
sand	10	0.50	5.0
silt	5	0.10	0.5
clay/pavement	0	0.00	0.0
		Variable Score	0.86

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	0	1.00	0.0
70 to 90	90	0.75	67.5
50 to 69	10	0.50	5.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	0.73

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	0	1.00	0.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	100	0.00	0.0
		Variable Score	0.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	0	1.00	0.0
50 to 75	100	0.75	75.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	0.75

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
1	15	4.446
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.83	12
Biogeochemical Functions	0.80	12
Plant Community Functions	0.66	10
Habitat Functions	0.82	12

Herbaceous	Function Score	FCU
Hydrology Functions	0.76	11
Biogeochemical Functions	0.71	11
Plant Community Functions	0.00	0
Habitat Functions	0.76	11

NOTE: percentages entered for each variable must sum to 100

Site Name - Unnamed Tributary 6 of Right Fork Hell Creek Pond 8B Post **Assessment Date -** 8/11/08

Impact Area (acres) - 0.01 **Impacted Stream Length (feet) -** 85

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	100	0.75	75.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.75

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	65	1.00	65.0
gravel (3/4 to 3 in.)	20	0.75	15.0
sand	10	0.50	5.0
silt	5	0.10	0.5
clay/pavement	0	0.00	0.0
		Variable Score	0.86

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	0	1.00	0.0
70 to 90	90	0.75	67.5
50 to 69	10	0.50	5.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	0.73

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	0	1.00	0.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	100	0.00	0.0
		Variable Score	0.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
Variable Score	1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	0	1.00	0.0
50 to 75	100	0.75	75.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	0.75

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
2	85	1.569
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.83	70
Biogeochemical Functions	0.80	68
Plant Community Functions	0.66	56
Habitat Functions	0.82	69

Herbaceous	Function Score	FCU
Hydrology Functions	0.76	65
Biogeochemical Functions	0.71	60
Plant Community Functions	0.00	0
Habitat Functions	0.76	65

NOTE: percentages entered for each variable must sum to 100

Site Name - Unnamed Tributary 1 of Unnamed Tributary 1 of Pigeonroost Creek Post **Assessment Date -** 8/11/08

Impact Area (acres) - 0.00 **Impacted Stream Length (feet) -** 55

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	100	0.75	75.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.75

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	68	1.00	68.0
gravel (3/4 to 3 in.)	18	0.75	13.5
sand	1	0.50	0.5
silt	13	0.10	1.3
clay/pavement	0	0.00	0.0
		Variable Score	0.83

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	100	1.00	100.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	100	1.00	100.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
1	55	1.213
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.93	51
Biogeochemical Functions	0.93	51
Plant Community Functions	0.87	48
Habitat Functions	0.85	47

Herbaceous	Function Score	FCU
Hydrology Functions	0.76	42
Biogeochemical Functions	0.71	39
Plant Community Functions	0.00	0
Habitat Functions	0.76	42

NOTE: percentages entered for each variable must sum to 100

Site Name - Unnamed Tributary 2 of Pigeonroost Creek IUAR11 Crossing Post **Assessment Date -** 8/11/08

Impact Area (acres) - 0.00 **Impacted Stream Length (feet) -** 122

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	100	0.75	75.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.75

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	97	1.00	97.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	3	0.10	0.3
		Variable Score	0.97

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	66	1.00	66.0
gravel (3/4 to 3 in.)	14	0.75	10.5
sand	0	0.50	0.0
silt	20	0.10	2.0
clay/pavement	0	0.00	0.0
		Variable Score	0.79

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	99	1.00	99.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	1	0.00	0.0
		Variable Score	0.99

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	99	1.00	99.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	1	0.00	0.0
		Variable Score	0.99

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	100	1.00	100.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
Variable Score	1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
1	122	0.547
	Variable Score	0.55

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.87	106
Biogeochemical Functions	0.89	109
Plant Community Functions	0.86	105
Habitat Functions	0.81	99

Herbaceous	Function Score	FCU
Hydrology Functions	0.71	86
Biogeochemical Functions	0.62	75
Plant Community Functions	0.00	0
Habitat Functions	0.71	86

NOTE: percentages entered for each variable must sum to 100

Site Name - Unnamed Tributary 2 of Pigeonroost Creek Pond 11 Post **Assessment Date -** 8/11/08

Impact Area (acres) - 0.01 **Impacted Stream Length (feet) -** 37

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	100	0.75	75.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.75

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	97	1.00	97.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	3	0.10	0.3
		Variable Score	0.97

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	66	1.00	66.0
gravel (3/4 to 3 in.)	14	0.75	10.5
sand	0	0.50	0.0
silt	20	0.10	2.0
clay/pavement	0	0.00	0.0
		Variable Score	0.79

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	99	1.00	99.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	1	0.00	0.0
		Variable Score	0.99

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	99	1.00	99.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	1	0.00	0.0
		Variable Score	0.99

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	100	1.00	100.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
2	37	3.605
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.92	34
Biogeochemical Functions	0.93	34
Plant Community Functions	0.86	32
Habitat Functions	0.85	31

Herbaceous	Function Score	FCU
Hydrology Functions	0.75	28
Biogeochemical Functions	0.70	26
Plant Community Functions	0.00	0
Habitat Functions	0.75	28

NOTE: percentages entered for each variable must sum to 100

Site Name - Unnamed Tributary 3 of Pigeonroost Creek Post **Assessment Date -** 11/1/07

Impact Area (acres) - 0.02 **Impacted Stream Length (feet) -** 117

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	100	0.75	75.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.75

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	97	1.00	97.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	3	0.10	0.3
		Variable Score	0.97

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	66	1.00	66.0
gravel (3/4 to 3 in.)	14	0.75	10.5
sand	0	0.50	0.0
silt	20	0.10	2.0
clay/pavement	0	0.00	0.0
		Variable Score	0.79

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	99	1.00	99.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	1	0.00	0.0
		Variable Score	0.99

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	99	1.00	99.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	1	0.00	0.0
		Variable Score	0.99

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	100	1.00	100.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
4	117	2.280
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.92	108
Biogeochemical Functions	0.93	108
Plant Community Functions	0.86	101
Habitat Functions	0.85	99

Herbaceous	Function Score	FCU
Hydrology Functions	0.75	88
Biogeochemical Functions	0.70	82
Plant Community Functions	0.00	0
Habitat Functions	0.75	88

NOTE: percentages entered for each variable must sum to 100

Site Name - Unnamed Tributary of Pigeon Creek Post **Assessment Date -** 8/11/08

Impact Area (acres) - 0.04 **Impacted Stream Length (feet) -** 552

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	0	1.00	0.0
restored	100	0.75	75.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	**0.75**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	97	1.00	97.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	3	0.10	0.3
		Variable Score	**0.97**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	50	1.00	50.0
gravel (3/4 to 3 in.)	10	0.75	7.5
sand	0	0.50	0.0
silt	0	0.10	0.0
clay/pavement	40	0.00	0.0
		Variable Score	**0.58**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	10	0.50	5.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	**0.95**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	100	1.00	100.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	0	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
7	552	0.846
	Variable Score	**0.85**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.90**	**499**
Biogeochemical Functions	**0.91**	**504**
Plant Community Functions	**0.86**	**474**
Habitat Functions	**0.82**	**452**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.74**	**408**
Biogeochemical Functions	**0.68**	**374**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.72**	**395**

NOTE: percentages entered for each variable must sum to 100

Site Name - Unnamed Tributary 6 of Unnamed Tributary of Pigeon Creek Crossing 1 Post **Assessment Date -** 8/11/08

Impact Area (acres) - 0.01 **Impacted Stream Length (feet) -** 55

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	100	0.75	75.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.75

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	97	1.00	97.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	3	0.10	0.3
		Variable Score	0.97

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	55	1.00	55.0
gravel (3/4 to 3 in.)	40	0.75	30.0
sand	0	0.50	0.0
silt	3	0.10	0.3
clay/pavement	2	0.00	0.0
		Variable Score	0.85

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	100	1.00	100.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	100	1.00	100.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
1	55	1.213
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.93	51
Biogeochemical Functions	0.93	51
Plant Community Functions	0.87	48
Habitat Functions	0.86	47

Herbaceous	Function Score	FCU
Hydrology Functions	0.75	42
Biogeochemical Functions	0.70	39
Plant Community Functions	0.00	0
Habitat Functions	0.76	42

NOTE: percentages entered for each variable must sum to 100

Site Name - Unnamed Tributary 6 of Unnamed Tributary of Pigeon Creek Crossing 2 Post **Assessment Date -** 8/11/08

Impact Area (acres) - 0.00 **Impacted Stream Length (feet) -** 40

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	100	0.75	75.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.75

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	97	1.00	97.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	3	0.10	0.3
		Variable Score	0.97

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	55	1.00	55.0
gravel (3/4 to 3 in.)	40	0.75	30.0
sand	0	0.50	0.0
silt	3	0.10	0.3
clay/pavement	2	0.00	0.0
		Variable Score	0.85

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	100	1.00	100.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	100	1.00	100.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
1	40	1.667
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.93	37
Biogeochemical Functions	0.93	37
Plant Community Functions	0.87	35
Habitat Functions	0.86	34

Herbaceous	Function Score	FCU
Hydrology Functions	0.75	30
Biogeochemical Functions	0.70	28
Plant Community Functions	0.00	0
Habitat Functions	0.76	30

NOTE: percentages entered for each variable must sum to 100

OFF-SITE ESTABLISHMENT

Site Name - **Off-Site Establishment Channel 1** Assessment Date - **Office**

Impact Area (acres) - **0.043** Impacted Stream Length (feet) - **362**

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**0**	1.00	0.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**100**	0.50	50.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**90**	1.00	90.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**10**	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**25**	1.00	25.0
gravel (3/4 to 3 in.)	**30**	0.75	22.5
sand	**10**	0.50	5.0
silt	**0**	0.10	0.0
clay/pavement	**35**	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**90**	1.00	90.0
shrub	**10**	0.75	7.5
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**90**	1.00	90.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**90**	1.00	90.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
9	362	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.81**	**293**
Biogeochemical Functions	**0.82**	**296**
Plant Community Functions	**0.68**	**247**
Habitat Functions	**0.67**	**243**
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	**0.67**	**241**
Biogeochemical Functions	**0.57**	**206**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.59**	**214**

NOTE: percentages entered for each variable must sum to 100

Site Name - **Off-Site Establishment Channel 1a** Assessment Date - **Office**

Impact Area (acres) - **0.062** Impacted Stream Length (feet) - **517**

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**0**	1.00	0.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**100**	0.50	50.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**90**	1.00	90.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**10**	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**25**	1.00	25.0
gravel (3/4 to 3 in.)	**30**	0.75	22.5
sand	**10**	0.50	5.0
silt	**0**	0.10	0.0
clay/pavement	**35**	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**90**	1.00	90.0
shrub	**10**	0.75	7.5
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**90**	1.00	90.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**90**	1.00	90.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
12	517	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.81**	**419**
Biogeochemical Functions	**0.82**	**423**
Plant Community Functions	**0.68**	**353**
Habitat Functions	**0.67**	**347**
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	**0.67**	**345**
Biogeochemical Functions	**0.57**	**294**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.59**	**306**

NOTE: percentages entered for each variable must sum to 100

Site Name - **Off-Site Establishment Channel 5** Assessment Date - **Office**

Impact Area (acres) - **0.090** Impacted Stream Length (feet) - **735**

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**0**	1.00	0.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**100**	0.50	50.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**90**	1.00	90.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**10**	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**25**	1.00	25.0
gravel (3/4 to 3 in.)	**30**	0.75	22.5
sand	**10**	0.50	5.0
silt	**0**	0.10	0.0
clay/pavement	**35**	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**90**	1.00	90.0
shrub	**10**	0.75	7.5
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**90**	1.00	90.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**90**	1.00	90.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
18	735	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.81**	**596**
Biogeochemical Functions	**0.82**	**602**
Plant Community Functions	**0.68**	**502**
Habitat Functions	**0.67**	**493**
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	**0.67**	**490**
Biogeochemical Functions	**0.57**	**418**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.59**	**435**

NOTE: percentages entered for each variable must sum to 100

Site Name - **Off-Site Establishment Channel 5a** Assessment Date - **Office**

Impact Area (acres) - **0.065** Impacted Stream Length (feet) - **542**

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**0**	1.00	0.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**100**	0.50	50.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**90**	1.00	90.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**10**	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**25**	1.00	25.0
gravel (3/4 to 3 in.)	**30**	0.75	22.5
sand	**10**	0.50	5.0
silt	**0**	0.10	0.0
clay/pavement	**35**	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**90**	1.00	90.0
shrub	**10**	0.75	7.5
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**90**	1.00	90.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**90**	1.00	90.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
13	542	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.81**	**439**
Biogeochemical Functions	**0.82**	**444**
Plant Community Functions	**0.68**	**370**
Habitat Functions	**0.67**	**364**
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	**0.67**	**361**
Biogeochemical Functions	**0.57**	**308**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.59**	**321**

NOTE: percentages entered for each variable must sum to 100

Site Name - Off-Site Establishment Channel 6b **Assessment Date -** Office

Impact Area (acres) - 0.070 **Impacted Stream Length (feet) -** 588

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
14	588	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.81	476
Biogeochemical Functions	0.82	481
Plant Community Functions	0.68	402
Habitat Functions	0.67	394
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	0.67	392
Biogeochemical Functions	0.57	335
Plant Community Functions	0.00	0
Habitat Functions	0.59	348

NOTE: percentages entered for each variable must sum to 100

Site Name - **Off-Site Establishment Channel 20** Assessment Date - **Office**

Impact Area (acres) - **0.047** Impacted Stream Length (feet) - **387**

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**0**	1.00	0.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**100**	0.50	50.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**90**	1.00	90.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**10**	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**25**	1.00	25.0
gravel (3/4 to 3 in.)	**30**	0.75	22.5
sand	**10**	0.50	5.0
silt	**0**	0.10	0.0
clay/pavement	**35**	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**90**	1.00	90.0
shrub	**10**	0.75	7.5
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**90**	1.00	90.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**90**	1.00	90.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
9	387	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.81**	**314**
Biogeochemical Functions	**0.82**	**317**
Plant Community Functions	**0.68**	**264**
Habitat Functions	**0.67**	**260**
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	**0.67**	**258**
Biogeochemical Functions	**0.57**	**220**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.59**	**229**

NOTE: percentages entered for each variable must sum to 100

Site Name - Off-Site Establishment Channel 20a **Assessment Date -** Office

Impact Area (acres) - 0.060 **Impacted Stream Length (feet) -** 502

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
Variable Score	1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
12	502	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.81	407
Biogeochemical Functions	0.82	411
Plant Community Functions	0.68	343
Habitat Functions	0.67	337
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	0.67	335
Biogeochemical Functions	0.57	286
Plant Community Functions	0.00	0
Habitat Functions	0.59	297

NOTE: percentages entered for each variable must sum to 100

Site Name - **Off-Site Establishment Channel 21** Assessment Date - **Office**

Impact Area (acres) - **0.058** Impacted Stream Length (feet) - **480**

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**0**	1.00	0.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**100**	0.50	50.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**90**	1.00	90.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**10**	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**25**	1.00	25.0
gravel (3/4 to 3 in.)	**30**	0.75	22.5
sand	**10**	0.50	5.0
silt	**0**	0.10	0.0
clay/pavement	**35**	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**90**	1.00	90.0
shrub	**10**	0.75	7.5
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**90**	1.00	90.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**90**	1.00	90.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
11	480	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.81**	**389**
Biogeochemical Functions	**0.82**	**393**
Plant Community Functions	**0.68**	**328**
Habitat Functions	**0.67**	**322**
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	**0.67**	**320**
Biogeochemical Functions	**0.57**	**273**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.59**	**284**

NOTE: percentages entered for each variable must sum to 100

Site Name - Off-Site Establishment Channel 23 **Assessment Date -** Office

Impact Area (acres) - 0.105 **Impacted Stream Length (feet) -** 866

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
21	866	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.81	702
Biogeochemical Functions	0.82	709
Plant Community Functions	0.68	592
Habitat Functions	0.67	581
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	0.67	577
Biogeochemical Functions	0.57	493
Plant Community Functions	0.00	0
Habitat Functions	0.59	512

NOTE: percentages entered for each variable must sum to 100

Site Name - Off-Site Establishment Channel 28 **Assessment Date -** Office

Impact Area (acres) - 0.057 **Impacted Stream Length (feet) -** 474

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**0**	1.00	0.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**100**	0.50	50.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**90**	1.00	90.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**10**	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**25**	1.00	25.0
gravel (3/4 to 3 in.)	**30**	0.75	22.5
sand	**10**	0.50	5.0
silt	**0**	0.10	0.0
clay/pavement	**35**	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**90**	1.00	90.0
shrub	**10**	0.75	7.5
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**90**	1.00	90.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**90**	1.00	90.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
11	474	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.81**	**384**
Biogeochemical Functions	**0.82**	**388**
Plant Community Functions	**0.68**	**324**
Habitat Functions	**0.67**	**318**
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	**0.67**	**316**
Biogeochemical Functions	**0.57**	**270**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.59**	**280**

NOTE: percentages entered for each variable must sum to 100

Site Name - **Off-Site Establishment Channel 34** Assessment Date - **Office**

Impact Area (acres) - **0.067** Impacted Stream Length (feet) - **557**

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**0**	1.00	0.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**100**	0.50	50.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**90**	1.00	90.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**10**	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**25**	1.00	25.0
gravel (3/4 to 3 in.)	**30**	0.75	22.5
sand	**10**	0.50	5.0
silt	**0**	0.10	0.0
clay/pavement	**35**	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**90**	1.00	90.0
shrub	**10**	0.75	7.5
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**90**	1.00	90.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**90**	1.00	90.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
13	557	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
		Variable Score	**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.81**	**451**
Biogeochemical Functions	**0.82**	**456**
Plant Community Functions	**0.68**	**381**
Habitat Functions	**0.67**	**374**
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	**0.67**	**371**
Biogeochemical Functions	**0.57**	**317**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.59**	**330**

NOTE: percentages entered for each variable must sum to 100

Site Name - **Off-Site Establishment Channel 55** Assessment Date - **Office**

Impact Area (acres) - **0.106** Impacted Stream Length (feet) - **883**

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**0**	1.00	0.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**100**	0.50	50.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**90**	1.00	90.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**10**	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**25**	1.00	25.0
gravel (3/4 to 3 in.)	**30**	0.75	22.5
sand	**10**	0.50	5.0
silt	**0**	0.10	0.0
clay/pavement	**35**	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**90**	1.00	90.0
shrub	**10**	0.75	7.5
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**90**	1.00	90.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**90**	1.00	90.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
21	883	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.81**	**715**
Biogeochemical Functions	**0.82**	**723**
Plant Community Functions	**0.68**	**603**
Habitat Functions	**0.67**	**592**
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	**0.67**	**589**
Biogeochemical Functions	**0.57**	**502**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.59**	**522**

NOTE: percentages entered for each variable must sum to 100

Site Name - Off-Site Establishment Channel 63a **Assessment Date -** Office

Impact Area (acres) - 0.100 **Impacted Stream Length (feet) -** 846

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
20	846	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.81	685
Biogeochemical Functions	0.82	692
Plant Community Functions	0.68	578
Habitat Functions	0.67	568
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	0.67	564
Biogeochemical Functions	0.57	481
Plant Community Functions	0.00	0
Habitat Functions	0.59	501

NOTE: percentages entered for each variable must sum to 100

Site Name - Off-Site Establishment Channel 66 **Assessment Date -** Office

Impact Area (acres) - 0.069 **Impacted Stream Length (feet) -** 582

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**0**	1.00	0.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**100**	0.50	50.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**90**	1.00	90.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**10**	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**25**	1.00	25.0
gravel (3/4 to 3 in.)	**30**	0.75	22.5
sand	**10**	0.50	5.0
silt	**0**	0.10	0.0
clay/pavement	**35**	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**90**	1.00	90.0
shrub	**10**	0.75	7.5
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**90**	1.00	90.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**90**	1.00	90.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
14	582	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
		Variable Score	**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.81**	**472**
Biogeochemical Functions	**0.82**	**476**
Plant Community Functions	**0.68**	**398**
Habitat Functions	**0.67**	**390**
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	**0.67**	**388**
Biogeochemical Functions	**0.57**	**331**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.59**	**344**

NOTE: percentages entered for each variable must sum to 100

Site Name - Off-Site Establishment Channel 66a **Assessment Date -** Office

Impact Area (acres) - 0.099 **Impacted Stream Length (feet) -** 817

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
19	817	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.81	662
Biogeochemical Functions	0.82	669
Plant Community Functions	0.68	558
Habitat Functions	0.67	548
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	0.67	545
Biogeochemical Functions	0.57	465
Plant Community Functions	0.00	0
Habitat Functions	0.59	483

NOTE: percentages entered for each variable must sum to 100

Site Name - **Off-Site Establishment Channel 67** Assessment Date - **Office**

Impact Area (acres) - **0.092** Impacted Stream Length (feet) - **728**

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**0**	1.00	0.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**100**	0.50	50.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**90**	1.00	90.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**10**	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**25**	1.00	25.0
gravel (3/4 to 3 in.)	**30**	0.75	22.5
sand	**10**	0.50	5.0
silt	**0**	0.10	0.0
clay/pavement	**35**	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**90**	1.00	90.0
shrub	**10**	0.75	7.5
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**90**	1.00	90.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**90**	1.00	90.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
17	728	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.81**	**590**
Biogeochemical Functions	**0.82**	**596**
Plant Community Functions	**0.68**	**497**
Habitat Functions	**0.67**	**488**
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	**0.67**	**485**
Biogeochemical Functions	**0.57**	**414**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.59**	**431**

NOTE: percentages entered for each variable must sum to 100

Site Name - Off-Site Establishment Channel 67a **Assessment Date -** Office

Impact Area (acres) - 0.068 **Impacted Stream Length (feet) -** 563

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**0**	1.00	0.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**100**	0.50	50.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**90**	1.00	90.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**10**	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**25**	1.00	25.0
gravel (3/4 to 3 in.)	**30**	0.75	22.5
sand	**10**	0.50	5.0
silt	**0**	0.10	0.0
clay/pavement	**35**	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**90**	1.00	90.0
shrub	**10**	0.75	7.5
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**90**	1.00	90.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**90**	1.00	90.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
13	563	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.81**	**456**
Biogeochemical Functions	**0.82**	**461**
Plant Community Functions	**0.68**	**385**
Habitat Functions	**0.67**	**378**
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	**0.67**	**375**
Biogeochemical Functions	**0.57**	**320**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.59**	**333**

NOTE: percentages entered for each variable must sum to 100

Site Name - **Off-Site Establishment Channel 70** Assessment Date - **Office**

Impact Area (acres) - **0.080** Impacted Stream Length (feet) - **667**

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
Variable Score	1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
16	667	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.81	540
Biogeochemical Functions	0.82	546
Plant Community Functions	0.68	456
Habitat Functions	0.67	447
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	0.67	445
Biogeochemical Functions	0.57	380
Plant Community Functions	0.00	0
Habitat Functions	0.59	395

NOTE: percentages entered for each variable must sum to 100

Site Name - **Off-Site Establishment Channel 80** Assessment Date - **Office**

Impact Area (acres) - **0.077** Impacted Stream Length (feet) - **631**

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**0**	1.00	0.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**100**	0.50	50.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**90**	1.00	90.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**10**	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**25**	1.00	25.0
gravel (3/4 to 3 in.)	**30**	0.75	22.5
sand	**10**	0.50	5.0
silt	**0**	0.10	0.0
clay/pavement	**35**	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**90**	1.00	90.0
shrub	**10**	0.75	7.5
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**90**	1.00	90.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**90**	1.00	90.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
15	631	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
		Variable Score	**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.81**	**511**
Biogeochemical Functions	**0.82**	**516**
Plant Community Functions	**0.68**	**431**
Habitat Functions	**0.67**	**423**
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	**0.67**	**421**
Biogeochemical Functions	**0.57**	**359**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.59**	**373**

NOTE: percentages entered for each variable must sum to 100

Site Name - Off-Site Establishment Channel 85 **Assessment Date -** Office

Impact Area (acres) - 0.022 **Impacted Stream Length (feet) -** 183

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**0**	1.00	0.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**100**	0.50	50.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**90**	1.00	90.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**10**	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**25**	1.00	25.0
gravel (3/4 to 3 in.)	**30**	0.75	22.5
sand	**10**	0.50	5.0
silt	**0**	0.10	0.0
clay/pavement	**35**	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**90**	1.00	90.0
shrub	**10**	0.75	7.5
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**90**	1.00	90.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**90**	1.00	90.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
4	183	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.81**	**148**
Biogeochemical Functions	**0.82**	**150**
Plant Community Functions	**0.68**	**125**
Habitat Functions	**0.67**	**123**
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	**0.67**	**122**
Biogeochemical Functions	**0.57**	**104**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.59**	**108**

NOTE: percentages entered for each variable must sum to 100

Site Name - **Off-Site Establishment Channel 90** Assessment Date - **Office**

Impact Area (acres) - **0.122** Impacted Stream Length (feet) - **1,006**

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**0**	1.00	0.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**100**	0.50	50.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**90**	1.00	90.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**10**	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**25**	1.00	25.0
gravel (3/4 to 3 in.)	**30**	0.75	22.5
sand	**10**	0.50	5.0
silt	**0**	0.10	0.0
clay/pavement	**35**	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**90**	1.00	90.0
shrub	**10**	0.75	7.5
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**90**	1.00	90.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**90**	1.00	90.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**10**	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
24	1006	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.81**	**815**
Biogeochemical Functions	**0.82**	**823**
Plant Community Functions	**0.68**	**687**
Habitat Functions	**0.67**	**675**
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	**0.67**	**671**
Biogeochemical Functions	**0.57**	**572**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.59**	**595**

NOTE: percentages entered for each variable must sum to 100

Site Name - Off-Site Establishment Channel 90a **Assessment Date -** Office

Impact Area (acres) - 0.097 **Impacted Stream Length (feet) -** 797

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
19	797	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.81	646
Biogeochemical Functions	0.82	652
Plant Community Functions	0.68	544
Habitat Functions	0.67	535
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	0.67	531
Biogeochemical Functions	0.57	453
Plant Community Functions	0.00	0
Habitat Functions	0.59	472

NOTE: percentages entered for each variable must sum to 100

Site Name - Off-Site Establishment Channel 100 **Assessment Date -** Office

Impact Area (acres) - 0.040 **Impacted Stream Length (feet) -** 325

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
8	325	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.81	263
Biogeochemical Functions	0.82	266
Plant Community Functions	0.68	222
Habitat Functions	0.67	218
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	0.67	217
Biogeochemical Functions	0.57	185
Plant Community Functions	0.00	0
Habitat Functions	0.59	192

NOTE: percentages entered for each variable must sum to 100

Site Name - **Off-Site Establishment Channel 108a** Assessment Date - **Office**

Impact Area (acres) - **0.093** Impacted Stream Length (feet) - **776**

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
Variable Score	1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
18	776	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.81	629
Biogeochemical Functions	0.82	635
Plant Community Functions	0.68	530
Habitat Functions	0.67	521
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	0.67	517
Biogeochemical Functions	0.57	442
Plant Community Functions	0.00	0
Habitat Functions	0.59	459

NOTE: percentages entered for each variable must sum to 100

Site Name - Off-Site Establishment Channel 110 **Assessment Date -** Office

Impact Area (acres) - 0.114 **Impacted Stream Length (feet) -** 930

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
22	930	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.81	753
Biogeochemical Functions	0.82	761
Plant Community Functions	0.68	635
Habitat Functions	0.67	624
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	0.67	620
Biogeochemical Functions	0.57	529
Plant Community Functions	0.00	0
Habitat Functions	0.59	550

NOTE: percentages entered for each variable must sum to 100

Site Name - Off-Site Establishment Channel 110a **Assessment Date -** Office

Impact Area (acres) - 0.072 **Impacted Stream Length (feet) -** 600

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
Variable Score	1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
14	600	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.81	486
Biogeochemical Functions	0.82	491
Plant Community Functions	0.68	410
Habitat Functions	0.67	402
	2.98	

Herbaceous	Function Score	FCU
Hydrology Functions	0.67	400
Biogeochemical Functions	0.57	341
Plant Community Functions	0.00	0
Habitat Functions	0.59	355

NOTE: percentages entered for each variable must sum to 100

Site Name - **On-Site Establishment Channel 1** Assessment Date - **Office**

Impact Area (acres) - **0.086** Impacted Stream Length (feet) - **664**

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
16	664	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	0.10

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	463
Biogeochemical Functions	0.46	306
Plant Community Functions	0.68	454
Habitat Functions	0.61	407
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	381
Biogeochemical Functions	0.18	119
Plant Community Functions	0.00	0
Habitat Functions	0.51	339

NOTE: percentages entered for each variable must sum to 100

PROPOSED ON-SITE ESTABLISHMENT CHANNELS

Site Name - On-Site Establishment Channel 1 **Assessment Date -** Office

Impact Area (acres) - 0.095 **Impacted Stream Length (feet) -** 730

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
17	730	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	**0.10**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	509
Biogeochemical Functions	0.46	336
Plant Community Functions	0.68	499
Habitat Functions	0.61	447
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	419
Biogeochemical Functions	0.18	131
Plant Community Functions	0.00	0
Habitat Functions	0.51	372

NOTE: percentages entered for each variable must sum to 100

Site Name - On-Site Establishment Channel 1a **Assessment Date -** Office

Impact Area (acres) - 0.203 **Impacted Stream Length (feet) -** 1,535

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
37	1535	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	0.10

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	1071
Biogeochemical Functions	0.46	707
Plant Community Functions	0.68	1049
Habitat Functions	0.61	940
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	881
Biogeochemical Functions	0.18	276
Plant Community Functions	0.00	0
Habitat Functions	0.51	783

NOTE: percentages entered for each variable must sum to 100

Site Name - **On-Site Establishment Channel 5** Assessment Date - **Office**

Impact Area (acres) - **0.075** Impacted Stream Length (feet) - **552**

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
Variable Score	1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
13	552	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		0.10

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	385
Biogeochemical Functions	0.46	254
Plant Community Functions	0.68	377
Habitat Functions	0.61	338
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	317
Biogeochemical Functions	0.18	99
Plant Community Functions	0.00	0
Habitat Functions	0.51	281

NOTE: percentages entered for each variable must sum to 100

Site Name - On-Site Establishment Channel 5a **Assessment Date -** Office

Impact Area (acres) - 0.115 **Impacted Stream Length (feet) -** 879

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
21	879	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	0.10

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	613
Biogeochemical Functions	0.46	405
Plant Community Functions	0.68	600
Habitat Functions	0.61	538
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	505
Biogeochemical Functions	0.18	158
Plant Community Functions	0.00	0
Habitat Functions	0.51	448

NOTE: percentages entered for each variable must sum to 100

Site Name - On-Site Establishment Channel 6 **Assessment Date -** Office

Impact Area (acres) - 0.075 **Impacted Stream Length (feet) -** 552

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
Variable Score	1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
13	552	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		0.10

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	385
Biogeochemical Functions	0.46	254
Plant Community Functions	0.68	377
Habitat Functions	0.61	338
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	317
Biogeochemical Functions	0.18	99
Plant Community Functions	0.00	0
Habitat Functions	0.51	281

NOTE: percentages entered for each variable must sum to 100

Site Name - On-Site Establishment Channel 6b **Assessment Date -** Office

Impact Area (acres) - 0.117 **Impacted Stream Length (feet) -** 895

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
21	895	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	0.10

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	624
Biogeochemical Functions	0.46	412
Plant Community Functions	0.68	611
Habitat Functions	0.61	548
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	514
Biogeochemical Functions	0.18	161
Plant Community Functions	0.00	0
Habitat Functions	0.51	456

NOTE: percentages entered for each variable must sum to 100

Site Name - On-Site Establishment Channel 20 **Assessment Date -** Office

Impact Area (acres) - 0.127 **Impacted Stream Length (feet) -** 971

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
23	971	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	0.10

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	677
Biogeochemical Functions	0.46	447
Plant Community Functions	0.68	663
Habitat Functions	0.61	595
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	557
Biogeochemical Functions	0.18	175
Plant Community Functions	0.00	0
Habitat Functions	0.51	495

NOTE: percentages entered for each variable must sum to 100

Site Name - On-Site Establishment Channel 20a **Assessment Date -** Office

Impact Area (acres) - 0.118 **Impacted Stream Length (feet) -** 904

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
22	904	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	**0.10**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	631
Biogeochemical Functions	0.46	416
Plant Community Functions	0.68	618
Habitat Functions	0.61	554
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	519
Biogeochemical Functions	0.18	163
Plant Community Functions	0.00	0
Habitat Functions	0.51	461

NOTE: percentages entered for each variable must sum to 100

Site Name - On-Site Establishment Channel 21 **Assessment Date -** Office

Impact Area (acres) - 0.117 **Impacted Stream Length (feet) -** 892

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
21	892	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	0.10

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	622
Biogeochemical Functions	0.46	411
Plant Community Functions	0.68	609
Habitat Functions	0.61	546
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	512
Biogeochemical Functions	0.18	160
Plant Community Functions	0.00	0
Habitat Functions	0.51	455

NOTE: percentages entered for each variable must sum to 100

Site Name - On-Site Establishment Channel 23 **Assessment Date -** Office

Impact Area (acres) - 0.131 **Impacted Stream Length (feet) -** 1,002

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
24	1002	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	0.10

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	699
Biogeochemical Functions	0.46	461
Plant Community Functions	0.68	684
Habitat Functions	0.61	614
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	575
Biogeochemical Functions	0.18	180
Plant Community Functions	0.00	0
Habitat Functions	0.51	511

NOTE: percentages entered for each variable must sum to 100

Site Name - On-Site Establishment Channel 28 **Assessment Date -** Office

Impact Area (acres) - 0.171 **Impacted Stream Length (feet) -** 1,301

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
31	1301	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	0.10

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	908
Biogeochemical Functions	0.46	599
Plant Community Functions	0.68	889
Habitat Functions	0.61	797
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	747
Biogeochemical Functions	0.18	234
Plant Community Functions	0.00	0
Habitat Functions	0.51	663

NOTE: percentages entered for each variable must sum to 100

Site Name - **On-Site Establishment Channel 34** Assessment Date - **Office**

Impact Area (acres) - **0.111** Impacted Stream Length (feet) - **854**

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
20	854	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	0.10

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	596
Biogeochemical Functions	0.46	393
Plant Community Functions	0.68	583
Habitat Functions	0.61	523
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	490
Biogeochemical Functions	0.18	154
Plant Community Functions	0.00	0
Habitat Functions	0.51	435

NOTE: percentages entered for each variable must sum to 100

Site Name - On-Site Establishment Channel 34a **Assessment Date -** Office

Impact Area (acres) - 0.194 **Impacted Stream Length (feet) -** 1,447

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
34	1447	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	0.10

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	1010
Biogeochemical Functions	0.46	666
Plant Community Functions	0.68	988
Habitat Functions	0.61	886
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	831
Biogeochemical Functions	0.18	260
Plant Community Functions	0.00	0
Habitat Functions	0.51	738

NOTE: percentages entered for each variable must sum to 100

Site Name - **On-Site Establishment Channel 55** Assessment Date - **Office**

Impact Area (acres) - **0.113** Impacted Stream Length (feet) - **870**

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
Variable Score	1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
21	870	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	0.10

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	607
Biogeochemical Functions	0.46	400
Plant Community Functions	0.68	594
Habitat Functions	0.61	533
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	499
Biogeochemical Functions	0.18	157
Plant Community Functions	0.00	0
Habitat Functions	0.51	444

NOTE: percentages entered for each variable must sum to 100

Site Name - On-Site Establishment Channel 63a **Assessment Date -** Office

Impact Area (acres) - 0.117 **Impacted Stream Length (feet) -** 905

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
22	905	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	**0.10**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.70**	**631**
Biogeochemical Functions	**0.46**	**417**
Plant Community Functions	**0.68**	**618**
Habitat Functions	**0.61**	**554**
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	**0.57**	**519**
Biogeochemical Functions	**0.18**	**163**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.51**	**461**

NOTE: percentages entered for each variable must sum to 100

Site Name - On-Site Establishment Channel 66 **Assessment Date -** Office

Impact Area (acres) - 0.102 **Impacted Stream Length (feet) -** 787

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
19	787	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	**0.10**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.70**	**549**
Biogeochemical Functions	**0.46**	**362**
Plant Community Functions	**0.68**	**538**
Habitat Functions	**0.61**	**482**
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	**0.57**	**452**
Biogeochemical Functions	**0.18**	**142**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.51**	**401**

NOTE: percentages entered for each variable must sum to 100

Site Name - **On-Site Establishment Channel 66a** Assessment Date - **Office**

Impact Area (acres) - **0.116** Impacted Stream Length (feet) - **883**

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
21	883	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	0.10

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	616
Biogeochemical Functions	0.46	406
Plant Community Functions	0.68	603
Habitat Functions	0.61	541
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	507
Biogeochemical Functions	0.18	159
Plant Community Functions	0.00	0
Habitat Functions	0.51	450

NOTE: percentages entered for each variable must sum to 100

Site Name - **On-Site Establishment Channel 67** Assessment Date - **Office**

Impact Area (acres) - **0.167** Impacted Stream Length (feet) - **1,223**

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
29	1223	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	0.10

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	853
Biogeochemical Functions	0.46	563
Plant Community Functions	0.68	835
Habitat Functions	0.61	749
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	702
Biogeochemical Functions	0.18	220
Plant Community Functions	0.00	0
Habitat Functions	0.51	624

NOTE: percentages entered for each variable must sum to 100

Site Name - On-Site Establishment Channel 67a **Assessment Date -** Office

Impact Area (acres) - 0.161 **Impacted Stream Length (feet) -** 1,235

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
29	1235	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	0.10

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	862
Biogeochemical Functions	0.46	568
Plant Community Functions	0.68	844
Habitat Functions	0.61	756
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	709
Biogeochemical Functions	0.18	222
Plant Community Functions	0.00	0
Habitat Functions	0.51	630

NOTE: percentages entered for each variable must sum to 100

Site Name - **On-Site Establishment Channel 70** Assessment Date - **Office**

Impact Area (acres) - **0.098** Impacted Stream Length (feet) - **752**

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
Variable Score	1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
18	752	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		0.10

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	525
Biogeochemical Functions	0.46	346
Plant Community Functions	0.68	514
Habitat Functions	0.61	461
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	432
Biogeochemical Functions	0.18	135
Plant Community Functions	0.00	0
Habitat Functions	0.51	383

NOTE: percentages entered for each variable must sum to 100

Site Name - On-Site Establishment Channel 80 **Assessment Date -** Office

Impact Area (acres) - 0.178 **Impacted Stream Length (feet) -** 1,342

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
32	1342	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	0.10

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	936
Biogeochemical Functions	0.46	618
Plant Community Functions	0.68	917
Habitat Functions	0.61	822
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	770
Biogeochemical Functions	0.18	241
Plant Community Functions	0.00	0
Habitat Functions	0.51	684

NOTE: percentages entered for each variable must sum to 100

Site Name - On-Site Establishment Channel 80a **Assessment Date -** Office

Impact Area (acres) - 0.069 **Impacted Stream Length (feet) -** 532

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
Variable Score	1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
13	532	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		0.10

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	371
Biogeochemical Functions	0.46	245
Plant Community Functions	0.68	363
Habitat Functions	0.61	326
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	305
Biogeochemical Functions	0.18	96
Plant Community Functions	0.00	0
Habitat Functions	0.51	271

NOTE: percentages entered for each variable must sum to 100

Site Name - On-Site Establishment Channel 85 **Assessment Date -** Office

Impact Area (acres) - 0.175 **Impacted Stream Length (feet) -** 1,334

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
Variable Score	1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
32	1334	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	0.10

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	931
Biogeochemical Functions	0.46	614
Plant Community Functions	0.68	911
Habitat Functions	0.61	817
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	766
Biogeochemical Functions	0.18	240
Plant Community Functions	0.00	0
Habitat Functions	0.51	680

NOTE: percentages entered for each variable must sum to 100

Site Name - On-Site Establishment Channel 90 **Assessment Date -** Office

Impact Area (acres) - 0.132 **Impacted Stream Length (feet) -** 1,015

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
24	1015	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	0.10

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	708
Biogeochemical Functions	0.46	467
Plant Community Functions	0.68	693
Habitat Functions	0.61	622
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	583
Biogeochemical Functions	0.18	183
Plant Community Functions	0.00	0
Habitat Functions	0.51	518

NOTE: percentages entered for each variable must sum to 100

Site Name - On-Site Establishment Channel 90a **Assessment Date -** Office

Impact Area (acres) - 0.116 **Impacted Stream Length (feet) -** 884

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
21	884	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	**0.10**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	617
Biogeochemical Functions	0.46	407
Plant Community Functions	0.68	604
Habitat Functions	0.61	541
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	507
Biogeochemical Functions	0.18	159
Plant Community Functions	0.00	0
Habitat Functions	0.51	451

NOTE: percentages entered for each variable must sum to 100

Site Name - On-Site Establishment Channel 100 **Assessment Date -** Office

Impact Area (acres) - 0.104 **Impacted Stream Length (feet) -** 774

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
18	774	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	0.10

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	540
Biogeochemical Functions	0.46	356
Plant Community Functions	0.68	529
Habitat Functions	0.61	474
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	444
Biogeochemical Functions	0.18	139
Plant Community Functions	0.00	0
Habitat Functions	0.51	395

NOTE: percentages entered for each variable must sum to 100

Site Name - On-Site Establishment Channel 108 **Assessment Date -** Office

Impact Area (acres) - 0.138 **Impacted Stream Length (feet) -** 1,043

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
25	1043	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	0.10

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	728
Biogeochemical Functions	0.46	480
Plant Community Functions	0.68	713
Habitat Functions	0.61	639
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	599
Biogeochemical Functions	0.18	188
Plant Community Functions	0.00	0
Habitat Functions	0.51	532

NOTE: percentages entered for each variable must sum to 100

Site Name - **On-Site Establishment Channel 108a** Assessment Date - **Office**

Impact Area (acres) - **0.099** Impacted Stream Length (feet) - **758**

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
Variable Score	1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
18	758	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		0.10

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	529
Biogeochemical Functions	0.46	349
Plant Community Functions	0.68	518
Habitat Functions	0.61	464
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	435
Biogeochemical Functions	0.18	136
Plant Community Functions	0.00	0
Habitat Functions	0.51	387

NOTE: percentages entered for each variable must sum to 100

Site Name - On-Site Establishment Channel 110 **Assessment Date -** Office

Impact Area (acres) - 0.155 **Impacted Stream Length (feet) -** 1,172

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	**0.50**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	**0.91**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	**0.53**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	**0.98**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	**0.90**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
28	1172	1.588
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	**0.10**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	818
Biogeochemical Functions	0.46	539
Plant Community Functions	0.68	801
Habitat Functions	0.61	718
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	673
Biogeochemical Functions	0.18	211
Plant Community Functions	0.00	0
Habitat Functions	0.51	598

NOTE: percentages entered for each variable must sum to 100

Site Name - **On-Site Establishment Channel 110a** Assessment Date - **Office**

Impact Area (acres) - **0.137** Impacted Stream Length (feet) - **1,042**

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	0	1.00	0.0
restored	0	0.75	0.0
incised or excess sediment in channel	100	0.50	50.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	0.50

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	90	1.00	90.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	10	0.10	1.0
		Variable Score	0.91

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	25	1.00	25.0
gravel (3/4 to 3 in.)	30	0.75	22.5
sand	10	0.50	5.0
silt	0	0.10	0.0
clay/pavement	35	0.00	0.0
		Variable Score	0.53

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	90	1.00	90.0
shrub	10	0.75	7.5
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	0.98

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	90	1.00	90.0
70 to 90	0	0.75	0.0
50 to 69	0	0.50	0.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	90	1.00	90.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	10	0.00	0.0
		Variable Score	0.90

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
	Variable Score 1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	100	1.00	100.0
50 to 75	0	0.75	0.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	1.00

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
25	1042	1.588
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	0	1.00	0.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	100	0.10	10.0
Less than 1% slope with no step pools	0	0.00	0.0
		Variable Score	0.10

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.70	727
Biogeochemical Functions	0.46	480
Plant Community Functions	0.68	712
Habitat Functions	0.61	638
	2.45	

Herbaceous	Function Score	FCU
Hydrology Functions	0.57	598
Biogeochemical Functions	0.18	187
Plant Community Functions	0.00	0
Habitat Functions	0.51	531

NOTE: percentages entered for each variable must sum to 100

PRESERVATION

Site Name - LUT1 at Reach B **Assessment Date -** 10/7/08

Impact Area (acres) - 0.04 **Impacted Stream Length (feet) -** 437

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**100**	1.00	100.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**100**	1.00	100.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**0**	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**50**	1.00	50.0
gravel (3/4 to 3 in.)	**30**	0.75	22.5
sand	**20**	0.50	10.0
silt	**0**	0.10	0.0
clay/pavement	**0**	0.00	0.0
		Variable Score	**0.83**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**100**	1.00	100.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**100**	1.00	100.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
2	437	0.305
	Variable Score	**0.31**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.90**	**393**
Biogeochemical Functions	**0.94**	**411**
Plant Community Functions	**1.00**	**437**
Habitat Functions	**0.92**	**404**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.73**	**321**
Biogeochemical Functions	**0.66**	**288**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.79**	**346**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	A.G.
County:	Mingo
Latitude:	37° 44' 12.87"
Longitude:	82° 13' 20.06"
Topo Quad:	Delbarton

Remarks: No Photo Available

Photos

Identifier	Description

Site Name - LUT2 at Reach C **Assessment Date -** 10/7/08

Impact Area (acres) - 0.01 **Impacted Stream Length (feet) -** 289

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**100**	1.00	100.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**100**	1.00	100.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**0**	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**50**	1.00	50.0
gravel (3/4 to 3 in.)	**30**	0.75	22.5
sand	**20**	0.50	10.0
silt	**0**	0.10	0.0
clay/pavement	**0**	0.00	0.0
		Variable Score	**0.83**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**100**	1.00	100.0
70 to 90	**0**	0.75	0.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**100**	1.00	100.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
1	289	0.231
	Variable Score	**0.23**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.89**	**256**
Biogeochemical Functions	**0.93**	**270**
Plant Community Functions	**1.00**	**289**
Habitat Functions	**0.92**	**265**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.72**	**209**
Biogeochemical Functions	**0.64**	**185**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.78**	**226**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	A.G.
County:	Mingo
Latitude:	37° 44' 6.98"
Longitude:	82° 13' 27.01"
Topo Quad:	Delbarton

Photos

Identifier	Description

Site Name - UT2 of RFHC **Assessment Date -** 10/30/07

Impact Area (acres) - 0.21 **Impacted Stream Length (feet) -** 770

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**85**	1.00	85.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**15**	0.50	7.5
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**0.93**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**100**	1.00	100.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**0**	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**65**	1.00	65.0
gravel (3/4 to 3 in.)	**5**	0.75	3.8
sand	**20**	0.50	10.0
silt	**5**	0.10	0.5
clay/pavement	**5**	0.00	0.0
		Variable Score	**0.79**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**0**	1.00	0.0
70 to 90	**10**	0.75	7.5
50 to 69	**80**	0.50	40.0
20 to 49	**10**	0.25	2.5
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**0.50**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**0**	1.00	0.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**100**	0.00	0.0
		Variable Score	**0.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**0**	1.00	0.0
50 to 75	**100**	0.75	75.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**0.75**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
156	770	13.511
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.85**	**654**
Biogeochemical Functions	**0.83**	**636**
Plant Community Functions	**0.68**	**524**
Habitat Functions	**0.88**	**679**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.80**	**617**
Biogeochemical Functions	**0.79**	**605**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.84**	**645**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	CF JM
County:	Mingo
Latitude:	37° 44' 1.30"
Longitude:	82° 13' 39.51"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 5 of Right Fork Hell Creek **Assessment Date -** 10/30/07

Impact Area (acres) - 0.03 **Impacted Stream Length (feet) -** 465

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)			
Type of Alteration	**%**	**Score**	**Weighted Average**
unaltered	**100**	1.00	100.0
restored	**0**	0.75	0.0
incised or excess sediment in channel	**0**	0.50	0.0
dammed	**0**	0.10	0.0
channelized/straightened	**0**	0.10	0.0
dredged	**0**	0.10	0.0
Channel >50% filled	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Slope of Watershed (*SLOPE*)			
Percent Slope	**%**	**Score**	**Weighted Average**
30 to 45 or unaltered	**100**	1.00	100.0
(20 to 29) or (46 to 65)	**0**	0.75	0.0
10 to 19	**0**	0.50	0.0
(5 to 9) or (66 to 90)	**0**	0.25	0.0
less than 5	**0**	0.10	0.0
		Variable Score	**1.00**

Average Stream Sediment Size (*SED*)			
USDA Texture	**%**	**Score**	**Weighted Average**
cobbles (>3 in.)	**60**	1.00	60.0
gravel (3/4 to 3 in.)	**20**	0.75	15.0
sand	**10**	0.50	5.0
silt	**0**	0.10	0.0
clay/pavement	**10**	0.00	0.0
		Variable Score	**0.80**

Land Cover Within Watershed (*COVER*)			
Land cover	**%**	**Score**	**Weighted Average**
forest	**100**	1.00	100.0
shrub	**0**	0.75	0.0
orchards	**0**	0.50	0.0
pasture or hay	**0**	0.25	0.0
urban, roads	**0**	0.00	0.0
		Variable Score	**1.00**

Average Percent Cover of Trees (*TREE*) (>3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 90	**0**	1.00	0.0
70 to 90	**100**	0.75	75.0
50 to 69	**0**	0.50	0.0
20 to 49	**0**	0.25	0.0
10 to 19	**0**	0.10	0.0
less than 10	**0**	0.00	0.0
		Variable Score	**0.75**

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 50	**0**	1.00	0.0
20 to 50	**0**	0.50	0.0
10 to 19	**0**	0.25	0.0
less than 10	**100**	0.00	0.0
		Variable Score	**0.00**

Average Percent Cover of Herbaceous Vegetation (*HERB*)			
Percent Cover	**%**	**Score**	**Weighted Average**
70 to 100	**0**	0.10	0.0
less than 70	**0**	0.00	0.0
		Variable Score	**0.00**

Number of Native Species (*COMP*)	
# of species	**Score**
5	1.00
Variable Score	**1.00**

Average Percent Cover of Detritus (*DETRITUS*)			
Percent Cover	**%**	**Score**	**Weighted Average**
Greater than 75	**100**	1.00	100.0
50 to 75	**0**	0.75	0.0
25 to 49	**0**	0.50	0.0
10 to 24	**0**	0.25	0.0
less than 10	**0**	0.10	0.0
		Variable Score	**1.00**

Large Woody Debris in Channel (*LWDEBRIS*)		
# of logs in channel	**Impacted stream length (feet)**	**Score**
10	465	1.434
	Variable Score	**1.00**

Channel Geomorphology (*CHANNGEO*)			
Slope and Pools	**%**	**Score**	**Weighted Average**
>4% slope with many step pools (or unaltered)	**100**	1.00	100.0
2 to 4% slope with common step pools	**0**	0.50	0.0
1 to 1.9% slope with few step pools	**0**	0.10	0.0
Less than 1% slope with no step pools	**0**	0.00	0.0
	Variable Score		**1.00**

Trees and Shrubs	Function Score	FCU
Hydrology Functions	**0.89**	**414**
Biogeochemical Functions	**0.89**	**414**
Plant Community Functions	**0.76**	**355**
Habitat Functions	**0.96**	**447**

Herbaceous	Function Score	FCU
Hydrology Functions	**0.82**	**380**
Biogeochemical Functions	**0.82**	**380**
Plant Community Functions	**0.00**	**0**
Habitat Functions	**0.87**	**405**

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	CF JM
County:	Mingo
Latitude:	37° 43' 38.71"
Longitude:	82° 13' 45.87"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

Site Name - Unnamed Tributary 6 of Right Fork Hell Creek **Assessment Date -** 10/30/07

Impact Area (acres) - 0.06 **Impacted Stream Length (feet) -** 635

NOTE: enter data only in colored cells

Stream channel alterations (*CHANNELALT*)

Type of Alteration	%	Score	Weighted Average
unaltered	100	1.00	100.0
restored	0	0.75	0.0
incised or excess sediment in channel	0	0.50	0.0
dammed	0	0.10	0.0
channelized/straightened	0	0.10	0.0
dredged	0	0.10	0.0
Channel >50% filled	0	0.00	0.0
		Variable Score	1.00

Average Percent Slope of Watershed (*SLOPE*)

Percent Slope	%	Score	Weighted Average
30 to 45 or unaltered	100	1.00	100.0
(20 to 29) or (46 to 65)	0	0.75	0.0
10 to 19	0	0.50	0.0
(5 to 9) or (66 to 90)	0	0.25	0.0
less than 5	0	0.10	0.0
		Variable Score	1.00

Average Stream Sediment Size (*SED*)

USDA Texture	%	Score	Weighted Average
cobbles (>3 in.)	65	1.00	65.0
gravel (3/4 to 3 in.)	20	0.75	15.0
sand	10	0.50	5.0
silt	5	0.10	0.5
clay/pavement	0	0.00	0.0
		Variable Score	0.86

Land Cover Within Watershed (*COVER*)

Land cover	%	Score	Weighted Average
forest	100	1.00	100.0
shrub	0	0.75	0.0
orchards	0	0.50	0.0
pasture or hay	0	0.25	0.0
urban, roads	0	0.00	0.0
		Variable Score	1.00

Average Percent Cover of Trees (*TREE*) (≥3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 90	0	1.00	0.0
70 to 90	90	0.75	67.5
50 to 69	10	0.50	5.0
20 to 49	0	0.25	0.0
10 to 19	0	0.10	0.0
less than 10	0	0.00	0.0
		Variable Score	0.73

Average Percent Cover of Shrubs (*SHRUB*) (>39 in tall and <3 in. dbh)

Percent Cover	%	Score	Weighted Average
Greater than 50	0	1.00	0.0
20 to 50	0	0.50	0.0
10 to 19	0	0.25	0.0
less than 10	100	0.00	0.0
		Variable Score	0.00

Average Percent Cover of Herbaceous Vegetation (*HERB*)

Percent Cover	%	Score	Weighted Average
70 to 100	0	0.10	0.0
less than 70	0	0.00	0.0
		Variable Score	0.00

Number of Native Species (*COMP*)

# of species	Score
5	1.00
Variable Score	1.00

Average Percent Cover of Detritus (*DETRITUS*)

Percent Cover	%	Score	Weighted Average
Greater than 75	0	1.00	0.0
50 to 75	100	0.75	75.0
25 to 49	0	0.50	0.0
10 to 24	0	0.25	0.0
less than 10	0	0.10	0.0
		Variable Score	0.75

Large Woody Debris in Channel (*LWDEBRIS*)

# of logs in channel	Impacted stream length (feet)	Score
53	635	5.566
	Variable Score	1.00

Channel Geomorphology (*CHANNGEO*)

Slope and Pools	%	Score	Weighted Average
>4% slope with many step pools (or unaltered)	100	1.00	100.0
2 to 4% slope with common step pools	0	0.50	0.0
1 to 1.9% slope with few step pools	0	0.10	0.0
Less than 1% slope with no step pools	0	0.00	0.0
	Variable Score		1.00

Trees and Shrubs	Function Score	FCU
Hydrology Functions	0.89	564
Biogeochemical Functions	0.86	548
Plant Community Functions	0.76	482
Habitat Functions	0.94	598

Herbaceous	Function Score	FCU
Hydrology Functions	0.82	518
Biogeochemical Functions	0.82	518
Plant Community Functions	0.00	0
Habitat Functions	0.88	558

NOTE: percentages entered for each variable must sum to 100

Investigator(s):	CF CM
County:	Mingo
Latitude:	37° 43' 37.87"
Longitude:	82° 13' 46.03"
Topo Quad:	Naugatuck

Remarks:

Photos

Identifier	Description

APPENDIX C

VIRGINIA UNIFIED STREAM METHODOLOGY (USM) SAMPLE FORMS AND PROJECT DATA

Stream Assessment Summary Form (Form 2)

Unified Stream Methodology

for use in Virginia

Project #	Applicant		Date
Buffalo Mt. Surface Mine	Consol of Kentucky, LLC		Nov-09
Evaluators		HUC	Locality
RE, AC, JM, CF, CM		5070201150	Mingo Co.

Stream Name	Length of Impact (L_I) (feet)	Reach Condition Index (RCI)	Impact Factor (IF)	Compensation Requirement (CR) ($L_I \times RCI \times IF$)
RFCB	2,296	1.20	1.00	2,755
UT1 RFCB	1,410	1.00	1.00	1,410
UT1 UT1 RFCB	100	1.06	1.00	106
UT2 UT1 RFCB	135	0.24	1.00	32
UT2 RFCB	180	1.14	1.00	205
UT3 RFCB	140	1.18	1.00	165
UT4 RFCB	450	1.08	1.00	486
UT5 RFCB	300	1.16	1.00	348
LFCB	2,737	1.14	1.00	3,120
PRC	3,338	1.10	1.00	3,672
UT1 UT1 PRC	55	0.24	1.00	13
UT2 PRC	159	0.98	1.00	156
UT3 PRC	117	1.12	1.00	131
UT5 PRC	1,900	1.12	1.00	2,128
LFPRC	140	1.08	1.00	151
RTB	4,344	1.12	1.00	4,865
UT3 RTB	65	1.12	1.00	73
UT8 RTB	130	1.26	1.00	164
UT10 RTB	125	1.18	1.00	148
UT12 RTB	300	1.20	1.00	360
UT13 RTB	272	1.04	1.00	283
UT15 RTB	970	1.06	1.00	1,028
UT17 RTB	1,086	0.98	1.00	1,064
UT1 UT17 RTB	800	1.10	1.00	880
UT18 RTB	800	1.02	1.00	816
UT19 RTB	100	1.20	1.00	120
RFH	4,280	1.20	1.00	5,136
UT1 RFH	2,615	1.18	1.00	3,086
UT10 UT1 RFH	80	0.90	1.00	72
UT11 UT1 RFH	1,080	1.16	1.00	1,253
UT4 RFH	1,700	1.21	1.00	2,057
UT1 UT4 RFH	90	1.23	1.00	111
UT3 UT4 RFH	310	1.10	1.00	341
UT5 RFH	100	1.17	1.00	117
UT6 RFH	100	1.11	1.00	111
UT7 RFH	520	1.12	1.00	582
UT10 RFH	385	1.26	1.00	485
UT11 RFH	500	0.98	1.00	490
LFH	3,120	1.20	1.00	3,744
UT1 LFH	3,600	1.06	1.00	3,816
UT2 UT1 LFH	300	1.02	1.00	306
UT5 UT1 LFH	200	0.98	1.00	196
UT8 LFH	115	1.00	1.00	115
UT9 LFH	135	1.04	1.00	140
UT10 LFH	2,960	1.07	1.00	3,167
UT1 UT10 LFH	566	1.07	1.00	606
UT1 UT1 UT10 LFH	337	1.08	1.00	364
UT2 UT10 LFH	360	0.96	1.00	346
UT11 LFH	1,000	1.06	1.00	1,060
UT12 LFH	305	1.14	1.00	348
UTPC	1,882	1.01	1.00	1,901
UT6 UTPC	95	1.13	1.00	107
UT4 MC	132	1.22	1.00	161
UT5 MC	2,450	0.99	1.00	2,426
UT SBPC	100	1.04	1.00	104
	51,866		**Total CR**	**57,427**

Stream Assessment Form (Form 1)

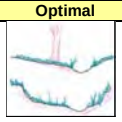
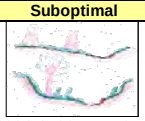
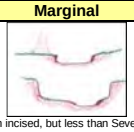
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		2296	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	Right Fork of Conley Branch

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

Conditional Category	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	CI
Score	3	2.4	2	1.6	1	2.3
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Conditional Category	Optimal	Suboptimal		Marginal		Poor		NOTES>>
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%			
	Score >	1.2									
									CI= (Sum % RA * Scores*0.01)/2		
Left Bank	% Riparian Area>	80%	20%					100%	Rt Bank CI >	1.20	CI
	Score >	1.2	1.1						Lt Bank CI >	1.18	1.19

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

NOTES>>

Conditional Category	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	1.10

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

NOTES>>

Conditional Category	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.40

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.20
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	2755
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

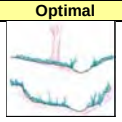
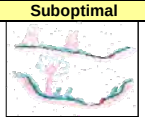
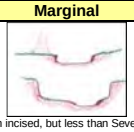
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		1410	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT1 of Right Fork of Conley Branch

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	1.6
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%			
	Score >	1.2									
									CI= (Sum % RA * Scores*0.01)/2		
Left Bank	% Riparian Area>	100%						100%	Rt Bank CI >	1.20	CI
	Score >	1.2							Lt Bank CI >	1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	0.90

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.30

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.00
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	1410
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

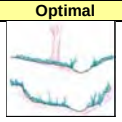
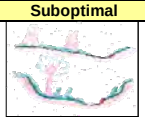
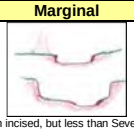
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		100	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT1 of UT1 of Right Fork of Conley Branch

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	1.6
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%		
	Score >	1.2								
									Cl= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%						100%	Rt Bank Cl > 1.20	CI
	Score >	1.2							Lt Bank Cl > 1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	1.20

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.30

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.06
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	106
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

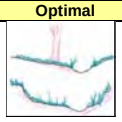
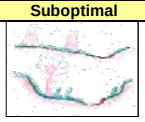
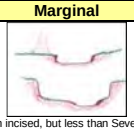
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		135	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT2 of UT1 of Right Fork of Conley Branch

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%			
	Score >	1.2									
									Cl= (Sum % RA * Scores*0.01)/2		
Left Bank	% Riparian Area>	100%						100%	Rt Bank Cl >	1.20	CI
	Score >	1.2							Lt Bank Cl >	1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	0.24
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	32
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

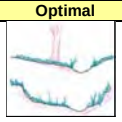
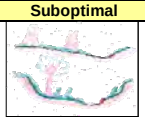
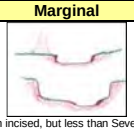
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		180	1

Name(s) of Evaluator(s)	Steam Name and Information
RE	UT2 of Right Fork of Conley Branch

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

Conditional Category	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.0
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Conditional Category	Optimal	Suboptimal		Marginal		Poor		NOTES>>
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%		
	Score >	1.2								
									Cl= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%						100%	Rt Bank Cl > 1.20	CI
	Score >	1.2							Lt Bank Cl > 1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

Conditional Category	Optimal	Suboptimal	Marginal	Poor	NOTES>>	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.		CI
Score	1.5	1.2	0.9	0.5		1.20

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

Conditional Category	Negligible	Minor		Moderate		Severe	NOTES>>	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.		
SCORE	1.5	1.3	1.1	0.9	0.7	0.5		1.30

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.14
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	205
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

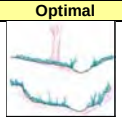
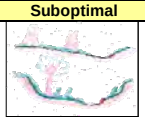
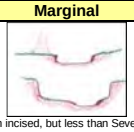
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		140	1

Name(s) of Evaluator(s)	Steam Name and Information
RE	UT3 of Right Fork of Conley Branch

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

Conditional Category	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.0
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Conditional Category	Optimal	Suboptimal		Marginal		Poor		NOTES>>
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%		
	Score >	1.2								
									Cl= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%						100%	Rt Bank Cl > 1.20	CI
	Score >	1.2							Lt Bank Cl > 1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

Conditional Category	Optimal	Suboptimal	Marginal	Poor	NOTES>>	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.		CI
Score	1.5	1.2	0.9	0.5		1.20

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

Conditional Category	Negligible	Minor		Moderate		Severe	NOTES>>	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.		
SCORE	1.5	1.3	1.1	0.9	0.7	0.5		1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.18
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	165
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

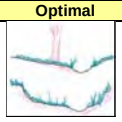
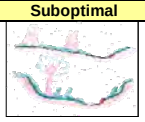
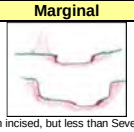
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		450	1

Name(s) of Evaluator(s)	Steam Name and Information
RE	UT4 of Right Fork of Conley Branch

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

Conditional Category	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.0
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Conditional Category	Optimal	Suboptimal		Marginal		Poor		NOTES>>
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%		
	Score >	1.2								
									Cl= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%						100%	Rt Bank Cl > 1.20	CI
	Score >	1.2							Lt Bank Cl > 1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

Conditional Category	Optimal	Suboptimal	Marginal	Poor	NOTES>>	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.		CI
Score	1.5	1.2	0.9	0.5		0.90

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

Conditional Category	Negligible	Minor		Moderate		Severe	NOTES>>
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.30

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.08
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	486
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

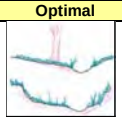
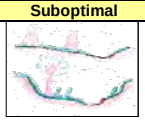
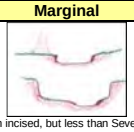
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		300	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT5 of Right Fork of Conley Branch

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.4
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%		
	Score >	1.2								
									Cl= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%						100%	Rt Bank Cl >	1.20
	Score >	1.2							Lt Bank Cl >	1.20

	CI
	CI
	1.20
	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
Score	1.5	1.2	0.9	0.5	0.90

	CI
	CI

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.30

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.16
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	348
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

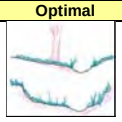
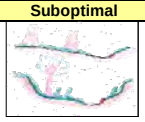
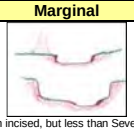
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		2737	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	Left Fork of Conley Branch

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

Conditional Category	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.1
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Conditional Category	Optimal	Suboptimal		Marginal		Poor		NOTES>>
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	97%	3%					100%			
	Score >	1.2	1.1								
									CI= (Sum % RA * Scores*0.01)/2		
Left Bank	% Riparian Area>	95%	5%					100%	Rt Bank CI >	1.20	CI
	Score >	1.2	1.1						Lt Bank CI >	1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

Conditional Category	Optimal	Suboptimal	Marginal	Poor	NOTES>>	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.		CI
Score	1.5	1.2	0.9	0.5		1.00

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

Conditional Category	Negligible	Minor		Moderate		Severe	NOTES>>	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.		
SCORE	1.5	1.3	1.1	0.9	0.7	0.5		1.40

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.14
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	3120
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

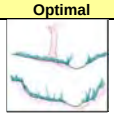
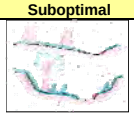
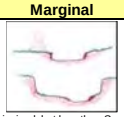
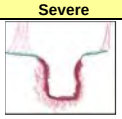
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		3338	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	Pigeonroost Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

Conditional Category	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.1
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Conditional Category	Optimal	Suboptimal		Marginal		Poor		NOTES>>
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%		
	Score >	1.2								
									CI= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	75%	25%					100%	Rt Bank CI > 1.20	CI
	Score >	1.2	1.1						Lt Bank CI > 1.18	1.19

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

NOTES>>

Conditional Category	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	0.90

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

NOTES>>

Conditional Category	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.30

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	**1.10**
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	**3672**
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

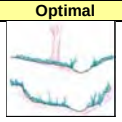
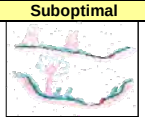
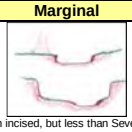
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		55	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT1 of UT1 of Pigeonroost Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%			
	Score >	1.2									
									CI= (Sum % RA * Scores*0.01)/2		
Left Bank	% Riparian Area>	100%						100%	Rt Bank CI >	1.20	CI
	Score >	1.2							Lt Bank CI >	1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	0.24
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	13
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

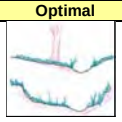
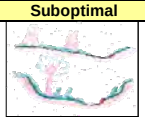
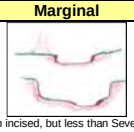
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		159	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT2 of Pigeonroost Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

Conditional Category	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	1.6
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Conditional Category	Optimal	Suboptimal		Marginal		Poor		NOTES>>
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%			
	Score >	1.1									
									Cl= (Sum % RA * Scores*0.01)/2		
Left Bank	% Riparian Area>	100%						100%	Rt Bank Cl >	1.10	CI
	Score >	1.1							Lt Bank Cl >	1.10	1.10

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

Conditional Category	Optimal	Suboptimal	Marginal	Poor	NOTES>>	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.		CI
Score	1.5	1.2	0.9	0.5		0.90

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

Conditional Category	Negligible	Minor		Moderate		Severe	NOTES>>	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.		
SCORE	1.5	1.3	1.1	0.9	0.7	0.5		1.30

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	0.98
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	156
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

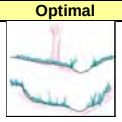
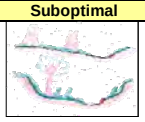
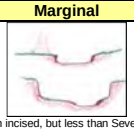
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		117	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT3 of Pigeonroost Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.0
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%		
	Score >	1.2								
									Cl= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%						100%	Rt Bank Cl >	1.20
	Score >	1.2							Lt Bank Cl >	1.20

	CI
	CI
	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

NOTES>>

	Conditional Category			
	Optimal	Suboptimal	Marginal	Poor
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.
Score	1.5	1.2	0.9	0.5

CI
0.90

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

NOTES>>

	Conditional Category					
	Negligible	Minor		Moderate		Severe
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
SCORE	1.5	1.3	1.1	0.9	0.7	0.5

1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.12

RCI= (Sum of all CI's)/5

COMPENSATION REQUIREMENT (CR) >>	131

CR = RCI X LF X IF

Stream Assessment Form (Form 1)

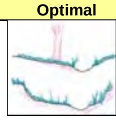
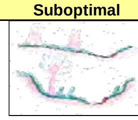
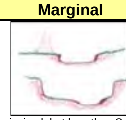
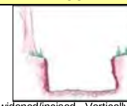
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		1900	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT5 of Pigeonroost Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	**Suboptimal**	**Marginal**	**Poor**	**Severe**	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.0
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category						
	Optimal	**Suboptimal**		**Marginal**		**Poor**	
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.
		High	**Low**	**High**	**Low**	**High**	**Low**
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5

NOTES>>

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%	
	Score >	1.2							
									CI= (Sum % RA * Scores*0.01)/2
Left Bank	% Riparian Area>	100%						100%	Rt Bank CI > 1.20
	Score >	1.2							Lt Bank CI > 1.20

CI 1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

NOTES>>

	Conditional Category				
	Optimal	**Suboptimal**	**Marginal**	**Poor**	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	0.90

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

NOTES>>

	Conditional Category					
	Negligible	**Minor**		**Moderate**		**Severe**
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
SCORE	1.5	1.3	1.1	0.9	0.7	0.5

CI 1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >> 1.12

RCI= (Sum of all CI's)/5

COMPENSATION REQUIREMENT (CR) >> 2128

CR = RCI X LF X IF

Stream Assessment Form (Form 1)

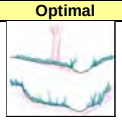
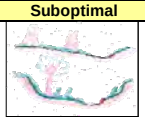
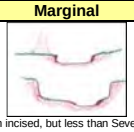
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		140	1

Name(s) of Evaluator(s)	Steam Name and Information
JM, CF	Left Fork of Pigeonroost Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	1.6
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>		
	Optimal	Suboptimal		Marginal		Poor				
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.			
		High	Low	High	Low	High	Low			
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5			

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	40%	60%					100%			
	Score >	1.2	1.5								
									CI= (Sum % RA * Scores*0.01)/2		
Left Bank	% Riparian Area>	40%	60%					100%	Rt Bank CI >	1.38	CI
	Score >	1.2	1.5						Lt Bank CI >	1.38	1.38

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>	
	Optimal	Suboptimal	Marginal	Poor		
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.		CI
Score	1.5	1.2	0.9	0.5		0.90

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>	
	Negligible	Minor		Moderate		Severe		
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.		
SCORE	1.5	1.3	1.1	0.9	0.7	0.5		1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.08
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	151
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

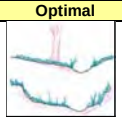
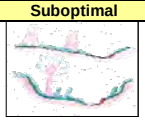
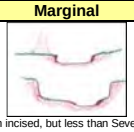
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		4344	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	Ruth Trace Branch

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

Conditional Category	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	1.9
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Conditional Category	Optimal	Suboptimal		Marginal		Poor		NOTES>>
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%			
	Score >	1.2									
									Cl= (Sum % RA * Scores*0.01)/2		
Left Bank	% Riparian Area>	100%						100%	Rt Bank Cl >	1.20	CI
	Score >	1.2							Lt Bank Cl >	1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

Conditional Category	Optimal	Suboptimal	Marginal	Poor	NOTES>>	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.		CI
Score	1.5	1.2	0.9	0.5		1.10

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

Conditional Category	Negligible	Minor		Moderate		Severe	NOTES>>	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.		RT
SCORE	1.5	1.3	1.1	0.9	0.7	0.5		1.40

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.12
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	4865
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

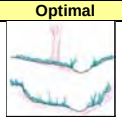
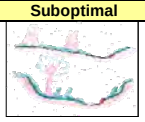
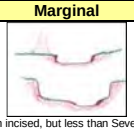
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		65	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT3 of Ruth Trace Branch

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.0
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%		
	Score >	1.2								
									Cl= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%						100%	Rt Bank Cl > 1.20	CI
	Score >	1.2							Lt Bank Cl > 1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

NOTES>>

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	0.90

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

NOTES>>

	Conditional Category					
	Negligible	Minor		Moderate		Severe
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
SCORE	1.5	1.3	1.1	0.9	0.7	0.5		1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.12
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	73
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

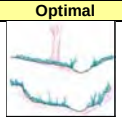
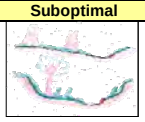
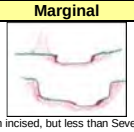
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		130	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT8 of Ruth Trace Branch

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.4
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%			
	Score >	1.2									
									CI= (Sum % RA * Scores*0.01)/2		
Left Bank	% Riparian Area>	100%						100%	Rt Bank CI >	1.20	CI
	Score >	1.2							Lt Bank CI >	1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	1.20

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.26
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	164
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

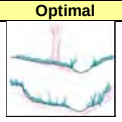
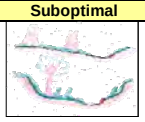
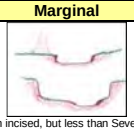
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		125	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT10 of Ruth Trace Branch

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.0
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%			
	Score >	1.2									
									Cl= (Sum % RA * Scores*0.01)/2		
Left Bank	% Riparian Area>	100%						100%	Rt Bank Cl >	1.20	CI
	Score >	1.2							Lt Bank Cl >	1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	1.20

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.18
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	148
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

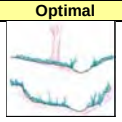
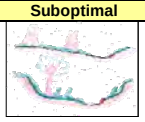
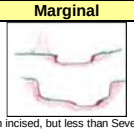
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		300	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT12 of Ruth Trace Branch

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.4
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%		
	Score >	1.2								
									CI= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%						100%	Rt Bank CI > 1.20	CI
	Score >	1.2							Lt Bank CI > 1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	0.90

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.20
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	360
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

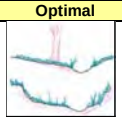
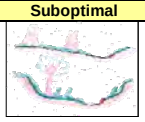
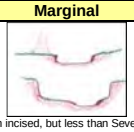
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		272	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT13 of Ruth Trace Branch

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

Conditional Category	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	1.6
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Conditional Category	Optimal	Suboptimal		Marginal		Poor		NOTES>>
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%		
	Score >	1.2								
									Cl= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%						100%	Rt Bank Cl > 1.20	CI
	Score >	1.2							Lt Bank Cl > 1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

Conditional Category	Optimal	Suboptimal	Marginal	Poor	NOTES>>	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.		CI
Score	1.5	1.2	0.9	0.5		0.90

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

Conditional Category	Negligible	Minor		Moderate		Severe	NOTES>>	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.		
SCORE	1.5	1.3	1.1	0.9	0.7	0.5		1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.04
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	283
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

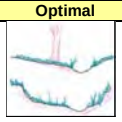
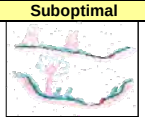
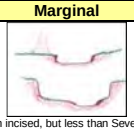
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		970	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT15 of Ruth Trace Branch

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	1.6
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%			
	Score >	1.2									
									CI= (Sum % RA * Scores*0.01)/2		
Left Bank	% Riparian Area>	100%						100%	Rt Bank CI >	1.20	CI
	Score >	1.2							Lt Bank CI >	1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	1.20

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.30

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.06
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	1028
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

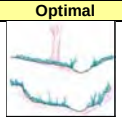
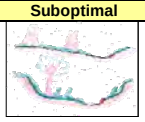
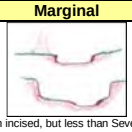
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		1086	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT17 of Ruth Trace Branch

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	1.6
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%		
	Score >	1.1								
									Cl= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%						100%	Rt Bank Cl > 1.10	CI
	Score >	1.1							Lt Bank Cl > 1.10	1.10

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	0.90

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.30

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	0.98
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	1064
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

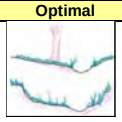
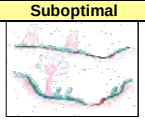
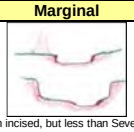
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		800	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT1 of UT17 of Ruth Trace Branch

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.0
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%			
	Score >	1.1									
									Cl= (Sum % RA * Scores*0.01)/2		
Left Bank	% Riparian Area>	100%						100%	Rt Bank Cl >	1.10	CI
	Score >	1.1							Lt Bank Cl >	1.10	1.10

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	0.90

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.10
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	880
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

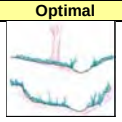
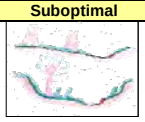
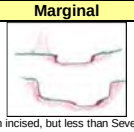
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		800	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT18 of Ruth Trace Branch

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	1.6
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%		
	Score >	1.2								
									Cl= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%						100%	Rt Bank Cl >	1.20
	Score >	1.2							Lt Bank Cl >	1.20

	CI
	CI
	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

NOTES>>

	Conditional Category			
	Optimal	Suboptimal	Marginal	Poor
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.
Score	1.5	1.2	0.9	0.5

	CI
	CI
	1.20

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

NOTES>>

	Conditional Category					
	Negligible	Minor		Moderate		Severe
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
SCORE	1.5	1.3	1.1	0.9	0.7	0.5

	1.10

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	**1.02**
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	**816**
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

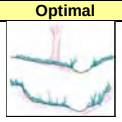
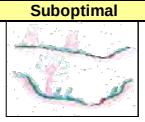
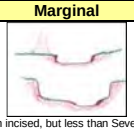
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		100	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT19 of Ruth Trace Branch

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

Conditional Category	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.4
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Conditional Category	Optimal	Suboptimal		Marginal		Poor		NOTES>>
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%			
	Score >	1.2									
									CI= (Sum % RA * Scores*0.01)/2		
Left Bank	% Riparian Area>	100%						100%	Rt Bank CI >	1.20	CI
	Score >	1.2							Lt Bank CI >	1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

Conditional Category	Optimal	Suboptimal	Marginal	Poor	NOTES>>	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.		CI
Score	1.5	1.2	0.9	0.5		0.90

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

Conditional Category	Negligible	Minor		Moderate		Severe	NOTES>>
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	**1.20**
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	**120**
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

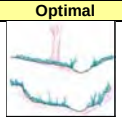
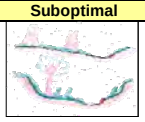
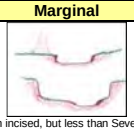
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		4280	1

Name(s) of Evaluator(s)	Steam Name and Information
CM, CF	Right Fork of Hell Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

Conditional Category	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.3
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Conditional Category	Optimal	Suboptimal		Marginal		Poor		NOTES>>
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%			
	Score >	1.2									
									Cl= (Sum % RA * Scores*0.01)/2		
Left Bank	% Riparian Area>	1.5%	1.5%	97%				100%	Rt Bank Cl >	1.20	CI
	Score >	0.5	0.6	1.2					Lt Bank Cl >	1.18	1.19

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

NOTES>>

Conditional Category	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	1.10

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

NOTES>>

Conditional Category	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.40

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.20
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	5136
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

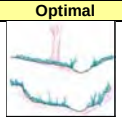
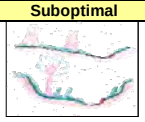
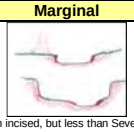
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		2615	1

Name(s) of Evaluator(s)	Steam Name and Information
JM, CF	UT1 of Right Fork of Hell Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.0
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	10%	70%	20%				100%		
	Score >	1.5	1.2	1.1						
									CI= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	10%	70%	20%				100%	Rt Bank CI > 1.21	CI
	Score >	1.5	1.2	1.1					Lt Bank CI > 1.21	1.21

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	1.20

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.18
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	3086
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

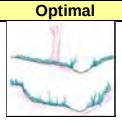
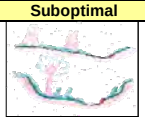
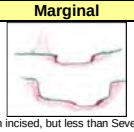
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		80	1

Name(s) of Evaluator(s)	Steam Name and Information
JM	UT10 of UT1 of Right Fork of Hell Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	1.6
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%			
	Score >	1.1									
									Cl= (Sum % RA * Scores*0.01)/2		
Left Bank	% Riparian Area>	100%						100%	Rt Bank Cl >	1.10	CI
	Score >	1.1							Lt Bank Cl >	1.10	1.10

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	0.50

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.30

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	**0.90**
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	**72**
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

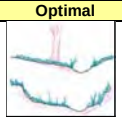
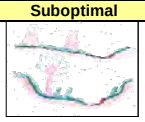
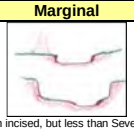
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		1080	1

Name(s) of Evaluator(s)	Steam Name and Information
JM	UT11 of UT1 of Right Fork of Hell Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.0
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	80%	20%					100%		
	Score >	1.1	1.2							
									Cl= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	80%	20%					100%	Rt Bank Cl > 1.12	CI
	Score >	1.1	1.2						Lt Bank Cl > 1.12	1.12

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	1.20

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.16
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	1253
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

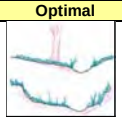
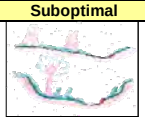
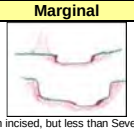
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		1700	1

Name(s) of Evaluator(s)	Steam Name and Information
JM	UT4 of Right Fork of Hell Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.0
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	25%	75%					100%		
	Score >	0.85	1.1							
									Cl= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	25%	75%					100%	Rt Bank Cl > 1.04	CI
	Score >	0.85	1.1						Lt Bank Cl > 1.04	1.04

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	1.50

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >> 1.21

RCI= (Sum of all CI's)/5

COMPENSATION REQUIREMENT (CR) >> 2057

CR = RCI X LF X IF

Stream Assessment Form (Form 1)

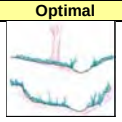
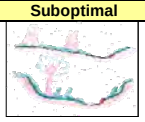
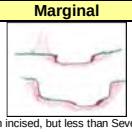
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		90	1

Name(s) of Evaluator(s)	Steam Name and Information
JM	UT1 of UT4 of Right Fork of Hell Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.4
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%		
	Score >	1.1								
									Cl= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%						100%	Rt Bank Cl > 1.10	CI
	Score >	1							Lt Bank Cl > 1.00	1.05

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	1.20

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.23
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	111
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

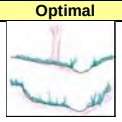
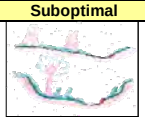
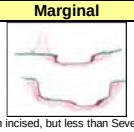
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		310	1

Name(s) of Evaluator(s)	Steam Name and Information
JM	UT3 of UT4 of Right Fork of Hell Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.0
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%		
	Score >	1.1								
									Cl= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%						100%	Rt Bank Cl > 1.10	CI
	Score >	1.1							Lt Bank Cl > 1.10	1.10

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	0.90

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.10
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	341
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

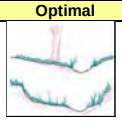
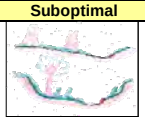
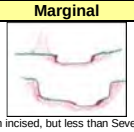
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		100	1

Name(s) of Evaluator(s)	Steam Name and Information
JM	UT5 of Right Fork of Hell Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

Conditional Category	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.4
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Conditional Category	Optimal	Suboptimal		Marginal		Poor		NOTES>>
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%		
	Score >	1.1								
									Cl= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%						100%	Rt Bank Cl > 1.10	CI
	Score >	1							Lt Bank Cl > 1.00	1.05

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

Conditional Category	Optimal	Suboptimal	Marginal	Poor	NOTES>>	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.		CI
Score	1.5	1.2	0.9	0.5		0.90

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

Conditional Category	Negligible	Minor		Moderate		Severe	NOTES>>	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.		
SCORE	1.5	1.3	1.1	0.9	0.7	0.5		1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.17
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	117
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

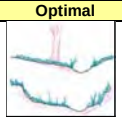
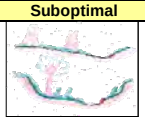
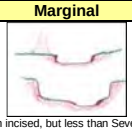
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		100	1

Name(s) of Evaluator(s)	Steam Name and Information
JM, CF	UT6 of Right Fork of Hell Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.0
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	50%	50%					100%		
	Score >	1.1	1.2							
									Cl= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	50%	50%					100%	Rt Bank Cl > 1.15	CI
	Score >	1.1	1.2						Lt Bank Cl > 1.15	1.15

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

NOTES>>

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	0.90

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

NOTES>>

	Conditional Category					
	Negligible	Minor		Moderate		Severe
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
SCORE	1.5	1.3	1.1	0.9	0.7	0.5		1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.11
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	111
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

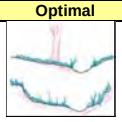
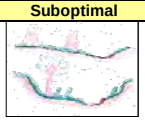
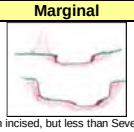
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		520	1

Name(s) of Evaluator(s)	Steam Name and Information
JM, CF	UT7 of Right Fork of Hell Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

Conditional Category	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.0
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Conditional Category	Optimal	Suboptimal		Marginal		Poor		NOTES>>
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	70%	30%					100%		
	Score >	0.85	1.1							
									Cl= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	80%	20%					100%	Rt Bank Cl > 0.93	CI
	Score >	0.85	1.1						Lt Bank Cl > 0.90	0.91

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

Conditional Category	Optimal	Suboptimal	Marginal	Poor	NOTES>>	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.		CI
Score	1.5	1.2	0.9	0.5		1.20

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

Conditional Category	Negligible	Minor		Moderate		Severe	NOTES>>	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.		
SCORE	1.5	1.3	1.1	0.9	0.7	0.5		1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.12
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	582
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

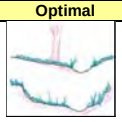
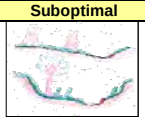
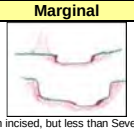
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		385	1

Name(s) of Evaluator(s)	Steam Name and Information
JM	UT10 of Right Fork of Hell Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.4
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%		
	Score >	1.2								
									Cl= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%						100%	Rt Bank Cl > 1.20	CI
	Score >	1.2							Lt Bank Cl > 1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	1.20

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.26
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	485
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

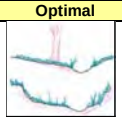
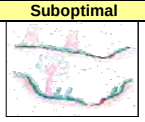
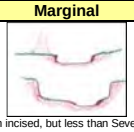
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		500	1

Name(s) of Evaluator(s)	Steam Name and Information
CM	UT11 of Right Fork of Hell Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.0
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%		
	Score >	1.2								
									Cl= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%						100%	Rt Bank Cl > 1.20	CI
	Score >	1.2							Lt Bank Cl > 1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	0.60

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.10

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	0.98
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	490
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

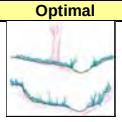
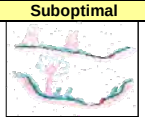
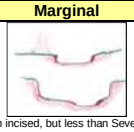
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		3120	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	Left Fork of Hell Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.1
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%			
	Score >	1.2									
									CI= (Sum % RA * Scores*0.01)/2		
Left Bank	% Riparian Area>	100%						100%	Rt Bank CI >	1.20	CI
	Score >	1.2							Lt Bank CI >	1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	1.20

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.20
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	3744
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

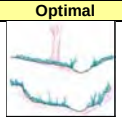
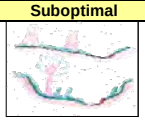
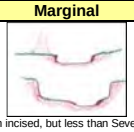
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		3600	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT1 of Left Fork of Hell Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	1.7
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%		
	Score >	1.2								
									CI= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	95%	5%					100%	Rt Bank CI > 1.20	CI
	Score >	1.2	1.1						Lt Bank CI > 1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	1.10

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.30

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.06
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	3816
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

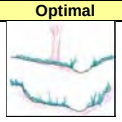
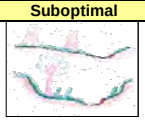
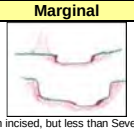
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		300	1

Name(s) of Evaluator(s)	Steam Name and Information
JM	UT2 of UT1 of Left Fork of Hell Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	1.6
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%		
	Score >	1.1								
									Cl= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%						100%	Rt Bank Cl > 1.10	CI
	Score >	1.1							Lt Bank Cl > 1.10	1.10

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	0.90

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.02
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	306
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

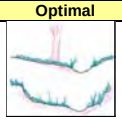
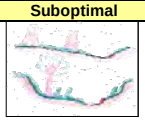
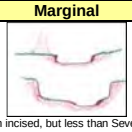
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		200	1

Name(s) of Evaluator(s)	Steam Name and Information
JM, CF	UT5 of UT1 of Left Fork of Hell Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	1.6
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	40%	60%					100%		
	Score >	1.5	1.2							
									CI= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	40%	60%					100%	Rt Bank CI > 1.32	CI
	Score >	1.5	1.2						Lt Bank CI > 1.32	1.32

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	0.50

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	0.98
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	196
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

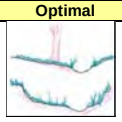
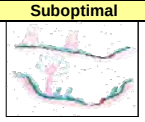
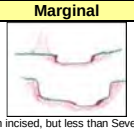
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		115	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT8 of Left Fork of Hell Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	1.6
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%		
	Score >	1.2								
									Cl= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%						100%	Rt Bank Cl > 1.20	CI
	Score >	1.2							Lt Bank Cl > 1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	0.90

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.30

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.00
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	115
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

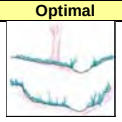
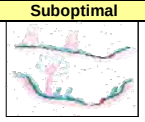
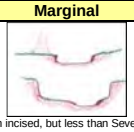
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		135	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT9 of Left Fork of Hell Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	1.6
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%			
	Score >	1.2									
									CI= (Sum % RA * Scores*0.01)/2		
Left Bank	% Riparian Area>	100%						100%	Rt Bank CI >	1.20	CI
	Score >	1.2							Lt Bank CI >	1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	0.90

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.04
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	140
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

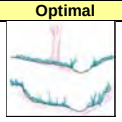
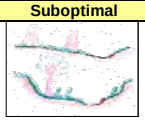
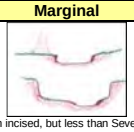
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		2960	1

Name(s) of Evaluator(s)	Steam Name and Information
JM, CF	UT10 of Left Fork of Hell Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	1.8
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	90%	10%					100%		
	Score >	1.5	1.2							
									Cl= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	90%	10%					100%	Rt Bank Cl > 1.47	CI
	Score >	1.5	1.2						Lt Bank Cl > 1.47	1.47

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	1.20

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	0.90

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.07
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	3167
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

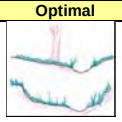
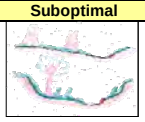
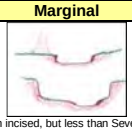
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		566	1

Name(s) of Evaluator(s)	Steam Name and Information
JM, CF	UT1 of UT10 of Left Fork of Hell Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.0
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	50%	40%	10%				100%		
	Score >	1.5	1.2	1.1						
									CI= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	50%	40%	10%				100%	Rt Bank CI > 1.34	CI
	Score >	1.5	1.2	1.1					Lt Bank CI > 1.34	1.34

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	0.90

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.10

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.07
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	606
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

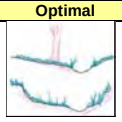
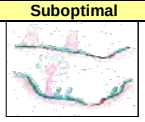
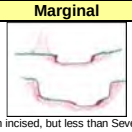
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		337	1

Name(s) of Evaluator(s)	Steam Name and Information
JM, CF	UT1 of UT1 of UT10 of Left Fork of Hell Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.0
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	60%	40%					100%		
	Score >	1.5	1.2							
									CI= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	60%	40%					100%	Rt Bank CI > 1.38	CI
	Score >	1.5	1.2						Lt Bank CI > 1.38	1.38

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	0.90

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.10

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.08
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	364
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

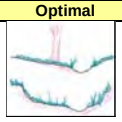
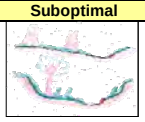
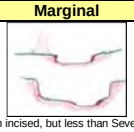
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		360	1

Name(s) of Evaluator(s)	Steam Name and Information
JM	UT2 of UT10 of Left Fork of Hell Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	1.6
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>		
	Optimal	Suboptimal		Marginal		Poor				
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.			
		High	Low	High	Low	High	Low			
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5			

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	70%	30%					100%			
	Score >	1.5	1.2								
									Cl= (Sum % RA * Scores*0.01)/2		
Left Bank	% Riparian Area>	70%	30%					100%	Rt Bank Cl >	1.41	CI
	Score >	1.5	1.2						Lt Bank Cl >	1.41	1.41

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

NOTES>>

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	0.50

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

NOTES>>

	Conditional Category					
	Negligible	Minor		Moderate		Severe
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
SCORE	1.5	1.3	1.1	0.9	0.7	0.5		1.30

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	0.96
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	346
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

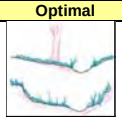
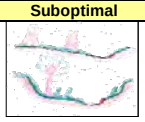
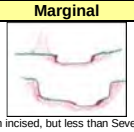
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		1000	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	IT11 of Left Fork of Hell Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	1.6
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%		
	Score >	1.2								
									CI= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%						100%	Rt Bank CI > 1.20	CI
	Score >	1.2							Lt Bank CI > 1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	1.20

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.30

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.06
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	1060
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

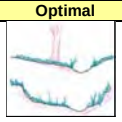
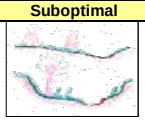
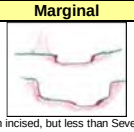
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		305	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT12 of Left Fork of Hell Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.0
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%		
	Score >	1.2								
									Cl= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%						100%	Rt Bank Cl > 1.20	CI
	Score >	1.2							Lt Bank Cl > 1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	1.20

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.30

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.14
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	348
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

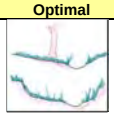
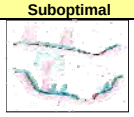
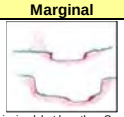
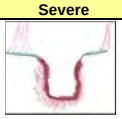
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		1882	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT of Pigeon Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

Conditional Category	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	1.6
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Conditional Category	Optimal	Suboptimal		Marginal		Poor		NOTES>>
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%		
	Score >	1.2								
									CI= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%						100%	Rt Bank CI > 1.20	CI
	Score >	1.1							Lt Bank CI > 1.10	1.15

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

Conditional Category	Optimal	Suboptimal	Marginal	Poor	NOTES>>	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.		CI
Score	1.5	1.2	0.9	0.5		1.20

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

Conditional Category	Negligible	Minor		Moderate		Severe	NOTES>>	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.		
SCORE	1.5	1.3	1.1	0.9	0.7	0.5		1.10

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	**1.01**
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	**1901**
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

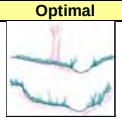
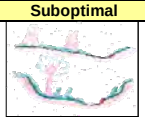
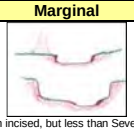
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		95	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT6 of UT of Pigeon Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

Conditional Category	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.0
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Conditional Category	Optimal	Suboptimal		Marginal		Poor		NOTES>>
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	50%	50%					100%		
	Score >	1.1	1.2							
									CI= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	50%	50%					100%	Rt Bank CI > 1.15	CI
	Score >	1.1	1.2						Lt Bank CI > 1.15	1.15

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

Conditional Category	Optimal	Suboptimal	Marginal	Poor	NOTES>>	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.		CI
Score	1.5	1.2	0.9	0.5		1.20

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

Conditional Category	Negligible	Minor		Moderate		Severe	NOTES>>	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.		
SCORE	1.5	1.3	1.1	0.9	0.7	0.5		1.30

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.13
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	107
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

Unified Stream Methodology for use in Virginia

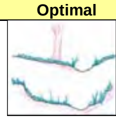
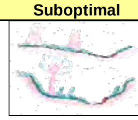
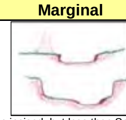
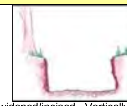
For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		132	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT4 of Miller Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

Conditional Category

	Optimal	Suboptimal	Marginal	Poor	Severe	
						
Channel Condition	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.4

NOTES>>

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Conditional Category

NOTES>>

	Optimal	Suboptimal		Marginal		Poor	
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.
		High	Low	High	Low	High	Low
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%			
	Score >	1.2									
									CI= (Sum % RA * Scores*0.01)/2		
Left Bank	% Riparian Area>	100%						100%	Rt Bank CI >	1.20	CI
	Score >	1.2							Lt Bank CI >	1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

NOTES>>

Conditional Category

	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	1.20

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

NOTES>>

Conditional Category

	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.30

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

***NOTE:* The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.22
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	161
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

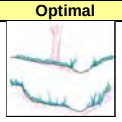
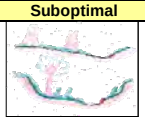
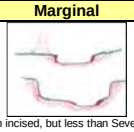
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		2450	1

Name(s) of Evaluator(s)	Steam Name and Information
RE, AC	UT5 of Miller Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	2.0
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	65%	32%					97%		
	Score >	1.1	1.2							
									Cl= (Sum % RA * Scores*0.01)/2	
Left Bank	% Riparian Area>	100%						100%	Rt Bank Cl > 1.10	CI
	Score >	1.2							Lt Bank Cl > 1.20	1.15

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	0.50

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.30

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	0.99
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	2426
CR = RCI X LF X IF	

Stream Assessment Form (Form 1)

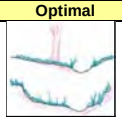
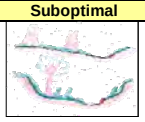
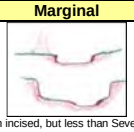
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 2007		100	1

Name(s) of Evaluator(s)	Steam Name and Information
JM, CF	UT of Stonecoal Branch of Pigeon Creek

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	 Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfu	 Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels	 Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may bevertical or undercut. AND/OR 40-60%	 Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR	 Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not p	CI
Score	3	2.4	2	1.6	1	1.6
NOTES>>						

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	**High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	**High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	**Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	**High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		High	Low	High	Low	High	Low	
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	100%						100%			
	Score >	1.2									
									CI= (Sum % RA * Scores*0.01)/2		
Left Bank	% Riparian Area>	100%						100%	Rt Bank CI >	1.20	CI
	Score >	1.2							Lt Bank CI >	1.20	1.20

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	CI
Score	1.5	1.2	0.9	0.5	0.90

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	Minor		Moderate		Severe	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.50

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

THE REACH CONDITION INDEX (RCI) >>	1.04
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	104
CR = RCI X LF X IF	

Stream Assessment Summary Form on Project (Form 2)

Unified Stream Methodology
for use in Virginia

Project #	Applicant		Date
Buffalo Mt. Surface Mine	CONSOL of Kentucky LLC		May-08
Evaluators			Locality
Baker			Mingo Co.
Stream Name	Length of Impact (L_I) (feet)	Compensation Requirement (CR)	% Total
Buffalo Mt. Impact Streams	51,782	57,341	--
Total L_I	51,782	57,341	--
Stream Name	Comp. Length (L_C) (feet)	Compensation Credit (CC)	% Total
On-Site Establishment	29,079	15,703	27%
Off-Site Establishment	16,345	6,701	12%
On-Site Restoration	10,131	11,853	21%
Off-Site LFHC & RFHC (Rest, Enh, Pres)	14,323	9,476	17%
Total	68,389	43,733	76%
Water Quality Improvement	--	--	24%
Net Remaining	16,375	-13,608	100%

Compensation Crediting Form (Form 3)

Unified Stream Methodology for use in Virginia

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach #	Reach Length	
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Apr 08		29079	

Name(s) of Evaluator(s)	Steam Name and Information
CM	On-site Establishment

Project Credits

Restoration: Includes Priority 1, 2, and 3 restoration activities. Does not include buffer width.

List Reaches that will receive full Restoration:

Total length of Full Restoration: 0 — Credit per foot: 1 — Credits = 0

Credits = Stream Length X 1.0

Enhancement With Instream Structures: Addressing Streambank Stability, Grade Control (Vanes, Weirs, Step-Pools), Constructed Riffles

On-Site Stream Re-establishment

On-Site Creation

Length Affected by Instream Structures: 29079 — Credit per foot: 0.3 — Credits = 8723.7

Credits = Stream Length X 0.3

Enhancement: Addressing Streambank Stability, Entrenchment Ratios, Access to Floodplain

Mitigation Categories

	Mechanical Bank Work			Biological Bank Work	
	Credit Per Structure	Pick One Per Length		May Be Cumulative Per Length	
Activities	Habitat Structures	Create Bankfull Bench	Lay Back Banks	Bio-Remediation Techniques	Stream Bank Plantings ONLY
Credit per foot per	0.1	0.15	0.1	0.1	0.09

Right Bank	Length							0
	Credit>							
Left Bank	Length							0
	Credit >							

CREDITS: Rt Bank > 0.00 — Lt Bank > 0.00 — SUM of banks: 0 — Credit

Σ(Length X Credit) for all areas (banks done separately)

Riparian Areas: Assess the proposed 100 foot buffer on both banks based on the activity proposed. Enter the percentage of area and the credit below. (Widths of buffer above 100' will be determined below)

Activities	Buffer Re-establishment (removal of invasives)	Buffer Planting - Heavy	Buffer Planting - Light	Preservation ONLY. No work proposed High Quality	Preservation ONLY. No work proposed Low Quality	Buffer area not within preservation width but within the first 100'
Credit for inner 100'	0.4	0.38	0.29	0.14	0.07	0
Credit for outer 100'	0.2	0.19	0.15	0.07		0

Calculation of "Goal" riparian buffer for each side (SAR length times 100') >>>> 2,907,900 square feet

Insert area in square feet for a given activity: ____ Percentage of "Goal">>>> 0.00%

WITHIN FIRST 100' - Mitigation Categories

Missing one vegetative community — Subtract 0.03 — Ensure the sums of % Riparian Blocks equal 100

Missing two vegetative communities — Subtract 0.06

Right Bank	% Area	50%	25%	25%				100%
	Credit>	0.14	0.38	0				
Left Bank	% Area	50%	25%	25%				100%
	Credit >	0.4	0.38	0				

CREDITS: Rt Bank > 0.17 — Lt Bank > 0.30 — Credit: 0.24 — 6978.96

Σ(% Area X Credit) for all areas (banks done separately)
AVE of credit for banks X length of project

WITHIN SECOND 100' - Mitigation Categories

Missing one vegetative community — Subtract 0.03 — Ensure the sums of % Riparian Blocks equal 100

Missing two vegetative communities — Subtract 0.06

Right Bank	% Area	0%						0%
	Credit>	0						
Left Bank	% Area	0%						0%
	Credit >	0						

CREDITS: Rt Bank > 0.00 — Lt Bank > 0.00 — Credit: 0.00 — 0

Σ(% Area X Credit) for all areas (banks done separately)
AVE of credit for banks X length of project

Adjustment Factors: These factors are applied as a multiplier to length of a reach for which they apply

Adjustment Factor Categories

Activity	Rare, Threatened, or Endangered Species or Communities	Livestock Exclusion	Watershed Preservation
Credit	0.1 - 0.3	0.1 - 0.3	0.1 - 0.3

Credits are cumulative and can apply to more than one reach. Each reach can have more than one Adjustment Factors

Stream Length Affected							
Credit>							

Credits > 0

ΣLength X Credit) for all areas

Total Compensation Credit Provided by Project: 15703

Compensation Crediting Form (Form 3)

Unified Stream Methodology for use in Virginia

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach #	Reach Length	
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Apr 08		16345	

Name(s) of Evaluator(s)	Steam Name and Information	Project Credits
CM	Off-Site Establishment	

Restoration: Includes Priority 1, 2, and 3 restoration activities. Does not include buffer width.

Credit per foot: 0

List Reaches that will receive full Restoration:

Total length of Full Restoration: | Credit per foot: 1

Credits = Stream Length X 1.0

Enhancement With Instream Structures: Addressing Streambank Stability, Grade Control (Vanes, Weirs, Step-Pools), Constructed Riffles

Credit per foot:

Discuss Length Affected by Instream Structures (justify length):

Length Affected by Instream Structures: 16345 | 0.3 | 4903.5

Credits = Stream Length X 0.3

Enhancement: Addressing Streambank Stability, Entrenchment Ratios, Access to Floodplain

Mitigation Categories

		Mechanical Bank Work			Biological Bank Work			
		Credit Per Structure	Pick One Per Length		May Be Cumulative Per Length			
Activities		Habitat Structures	Create Bankfull Bench	Lay Back Banks	Bio-Remediation Techniques		Stream Bank Plantings ONLY	
Credit per foot per		0.1	0.15	0.1	0.1		0.09	
Right Bank	Length						0	
	Credit>							
Left Bank	Length						0	
	Credit >							

CREDITS: Rt Bank > 0.00 | Lt Bank > 0.00 | Credit: SUM of banks = 0

Σ(Length X Credit) for all areas (banks done separately)

Riparian Areas: Assess the proposed 100 foot buffer on both banks based on the activity proposed. Enter the percentage of area and the credit below. (Widths of buffer above 100' will be determined below)

Activities	Buffer Re-establishment (removal of invasives)	Buffer Planting - Heavy	Buffer Planting - Light	Preservation ONLY. No work proposed High Quality	Preservation ONLY. No work proposed Low Quality	Buffer area not within preservation width but within the first 100'
Credit for inner 100'	0.4	0.38	0.29	0.14	0.07	0
Credit for outer 100'	0.2	0.19	0.15	0.07		0

Calculation of "Goal" riparian buffer for each side (SAR length times 100') >>>> 1,634,500 square feet

Insert area in square feet for a given activity: | Percentage of "Goal">>>> 0.00%

WITHIN FIRST 100' - Mitigation Categories

Missing one vegetative community — Subtract 0.03

Missing two vegetative communities — Subtract 0.06

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Area	75%	25%					100%
	Credit>	0.14	0					
Left Bank	% Area	75%	25%					100%
	Credit >	0.14	0					

CREDITS: Rt Bank > 0.11 | Lt Bank > 0.11 | Credit: 0.11 = 1797.95

Σ(% Area X Credit) for all areas (banks done separately)
AVE of credit for banks X length of project

WITHIN SECOND 100' - Mitigation Categories

Missing one vegetative community — Subtract 0.03

Missing two vegetative communities — Subtract 0.06

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Area	0%						0%
	Credit>	0						
Left Bank	% Area	0%						0%
	Credit >	0						

CREDITS: Rt Bank > 0.00 | Lt Bank > 0.00 | Credit: 0.00 = 0

Σ(% Area X Credit) for all areas (banks done separately)
AVE of credit for banks X length of project

Adjustment Factors: These factors are applied as a multiplier to length of a reach for which they apply

Adjustment Factor Categories

Activity	Rare, Threatened, or Endangered Species or Communities	Livestock Exclusion	Watershed Preservation
Credit	0.1 - 0.3	0.1 - 0.3	0.1 - 0.3

Credits are cumulative and can apply to more than one reach. Each reach can have more than one Adjustment Factors

Stream Length Affected							
Credit>							

Credits > 0

ΣLength X Credit) for all areas

Total Compensation Credit Provided by Project: 6701

Compensation Crediting Form (Form 3)

Unified Stream Methodology for use in Virginia

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach #	Reach Length	
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Apr 08		10131	

Name(s) of Evaluator(s)	Steam Name and Information	Project Credits
CM	On-Site Pond & Temporary Impact Restoration	

Restoration: Includes Priority 1, 2, and 3 restoration activities. Does not include buffer width.

List Reaches that will receive full Restoration:

Total length of Full Restoration: 10131 | Credit per foot: 1 | Credits: 10131

Credits = Stream Length X 1.0

Enhancement With Instream Structures: Addressing Streambank Stability, Grade Control (Vanes, Weirs, Step-Pools), Constructed Riffles

On-Site Stream Re-establishment

On-Site Creation

Length Affected by Instream Structures | Credit per foot: 0.3 | Credits: 0

Credits = Stream Length X 0.3

Enhancement: Addressing Streambank Stability, Entrenchment Ratios, Access to Floodplain

Mitigation Categories

		Mechanical Bank Work			Biological Bank Work			
		Credit Per Structure	Pick One Per Length		May Be Cumulative Per Length			
Activities		Habitat Structures	Create Bankfull Bench	Lay Back Banks	Bio-Remediation Techniques		Stream Bank Plantings ONLY	
Credit per foot per		0.1	0.15	0.1	0.1		0.09	
Right Bank	Length						0	
	Credit>							
Left Bank	Length						0	
	Credit >							

CREDITS: Rt Bank > 0.00 | Lt Bank > 0.00 | Credit: SUM of banks: 0

Σ(Length X Credit) for all areas (banks done separately)

Riparian Areas: Assess the proposed 100 foot buffer on both banks based on the activity proposed. Enter the percentage of area and the credit below. (Widths of buffer above 100' will be determined below)

Activities		Buffer Re-establishment (removal of invasives)	Buffer Planting - Heavy	Buffer Planting - Light	Preservation ONLY. No work proposed High Quality	Preservation ONLY. No work proposed Low Quality	Buffer area not within preservation width but within the first 100'
Credit for inner 100'		0.4	0.38	0.29	0.14	0.07	0
Credit for outer 100'		0.2	0.19	0.15	0.07		0

Calculation of "Goal" riparian buffer for each side (SAR length times 100') >>>> 1,013,100 square feet

Insert area in square feet for a given activity: | Percentage of "Goal">>>> 0.00%

WITHIN FIRST 100' - Mitigation Categories

Missing one vegetative community — Subtract 0.03 | Missing two vegetative communities — Subtract 0.06 | Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Area	40%	18%	17%	25%			100%
	Credit>	0.14	0.38	0.29	0			
Left Bank	% Area	40%	18%	17%	25%			100%
	Credit >	0.14	0.38	0.29	0			

CREDITS: Rt Bank > 0.17 | Lt Bank > 0.17 | Credit: 0.17 | 1722.27

Σ(% Area X Credit) for all areas (banks done separately)
AVE of credit for banks X length of project

WITHIN SECOND 100' - Mitigation Categories

Missing one vegetative community — Subtract 0.03 | Missing two vegetative communities — Subtract 0.06 | Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Area	0%						0%
	Credit>	0						
Left Bank	% Area	0%						0%
	Credit >	0						

CREDITS: Rt Bank > 0.00 | Lt Bank > 0.00 | Credit: 0.00 | 0

Σ(% Area X Credit) for all areas (banks done separately)
AVE of credit for banks X length of project

Adjustment Factors: These factors are applied as a multiplier to length of a reach for which they apply

Adjustment Factor Categories

Activity	Rare, Threatened, or Endangered Species or Communities	Livestock Exclusion	Watershed Preservation
Credit	0.1 - 0.3	0.1 - 0.3	0.1 - 0.3

Credits are cumulative and can apply to more than one reach. Each reach can have more than one Adjustment Factors

Stream Length Affected							
Credit>							

Credits > 0

ΣLength X Credit) for all areas

Total Compensation Credit Provided by Project: 11853

Compensation Crediting Form (Form 3)

Unified Stream Methodology for use in Virginia

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach #	Reach Length	
	Buffalo Mt. Surface Mine	Mingo Co.		5070201150	Oct 08		14323	

Name(s) of Evaluator(s)	Steam Name and Information	Project Credits
CM	Hell Creek Mitigation	

Restoration: Includes Priority 1, 2, and 3 restoration activities. Does not include buffer width.

Credit per foot: 4944

List Reaches that will receive full Restoration:

Total length of Full Restoration: 4944 | Credit per foot: 1

Credits = Stream Length X 1.0

Enhancement With Instream Structures: Addressing Streambank Stability, Grade Control (Vanes, Weirs, Step-Pools), Constructed Riffles

Credit per foot

On-Site Stream Re-establishment

Length Affected by Instream Structures: 4098 | 0.3 | 1229.4

Credits = Stream Length X 0.3

On-Site Creation

Enhancement: Addressing Streambank Stability, Entrenchment Ratios, Access to Floodplain

Mitigation Categories

	Mechanical Bank Work			Biological Bank Work	
	Credit Per Structure	Pick One Per Length		May Be Cumulative Per Length	
Activities	Habitat Structures	Create Bankfull Bench	Lay Back Banks	Bio-Remediation Techniques	Stream Bank Plantings ONLY
Credit per foot per	0.1	0.15	0.1	0.1	0.09

Right Bank	Length							0	
	Credit>								
Left Bank	Length							0	
	Credit >								

CREDITS

Rt Bank > 0.00 | Credit

Lt Bank > 0.00 | SUM of banks: 0

Σ(Length X Credit) for all areas (banks done separately)

Riparian Areas: Assess the proposed 100 foot buffer on both banks based on the activity proposed. Enter the percentage of area and the credit below. (Widths of buffer above 100' will be determined below)

Activities	Buffer Re-establishment (removal of invasives)	Buffer Planting - Heavy	Buffer Planting - Light	Preservation ONLY. No work proposed High Quality	Preservation ONLY. No work proposed Low Quality	Buffer area not within preservation width but within the first 100'
Credit for inner 100'	0.4	0.38	0.29	0.14	0.07	0
Credit for outer 100'	0.2	0.19	0.15	0.07		0

Calculation of "Goal" riparian buffer for each side (SAR length times 100') >>>> 1,432,300 square feet

Insert area in square feet for a given activity: | Percentage of "Goal">>>> 0.00%

WITHIN FIRST 100' - Mitigation Categories

Missing one vegetative community — Subtract 0.03

Missing two vegetative communities — Subtract 0.06

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Area	5%	5%	65%	25%			100%
	Credit>	0.38	0.29	0.14	0			
Left Bank	% Area	5%	5%	65%	25%			100%
	Credit >	0.28	0.29	0.14	0			

CREDITS

Rt Bank > 0.12 | Credit

Lt Bank > 0.12 | 0.12 | 1718.76

Σ(% Area X Credit) for all areas (banks done separately)
AVE of credit for banks X length of project

WITHIN SECOND 100' - Mitigation Categories

Missing one vegetative community — Subtract 0.03

Missing two vegetative communities — Subtract 0.06

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Area							0%
	Credit>							
Left Bank	% Area							0%
	Credit >							

CREDITS

Rt Bank > 0.00 | Credit

Lt Bank > 0.00 | 0.00 | 0

Σ(% Area X Credit) for all areas (banks done separately)
AVE of credit for banks X length of project

Adjustment Factors: These factors are applied as a multiplier to length of a reach for which they apply

Adjustment Factor Categories

Activity	Rare, Threatened, or Endangered Species or Communities	Livestock Exclusion	Watershed Preservation
Credit	0.1 - 0.3	0.1 - 0.3	0.1 - 0.3

Credits are cumulative and can apply to more than one reach. Each reach can have more than one Adjustment Factors

Stream Length Affected	5281						
Credit>	0.3						

Credits > 1584

ΣLength X Credit) for all areas

Total Compensation Credit Provided by Project: 9476

APPENDIX D

BEHI & NBS ASSESSMENT FORMS

PROPOSED IMPACT CHANNELS

Stream:	**RTB-P-P**			Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers:	**RE, CF**		Valley Type:		Date: **2/27/08**	

(1) Station (ft)	(2) BEHI rating (Worksheet 5-8) (adjective)	(3) NBS rating (Worksheet 5-9) (adjective)	(4) Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)	(5) Length of bank (ft)	(6) Study bank height (ft)	(7) Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)
1. --	**Very Low**	**Low**	**0.02**	**265**	**5**	**26.5**
2. --	**Moderate**	**Low**	**0.015**	**461**	**4.9**	**33.8835**
4. --	**Very High**	**Low**	**0.25**	**138**	**3.4**	**117.3**
6.	**Low**	**Low**	**0.025**	**36**	**1.2**	**1.08**
7.						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						

Sum erosion subtotals in Column (7) for each BEHI/NBS combination	**Total erosion (ft^3/yr)**	**178.7635**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}	**Total erosion (yds^3/yr)**	**6.621**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}	**Total erosion (tons/yr)**	**8.607**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}	**Total erosion (tons/yr/ft)**	**0.010**

Stream:	**RTB-P-I**			Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers:	**RE, CF**		Valley Type:		Date: **2/26/08**	

(1) Station (ft)	(2) BEHI rating (Worksheet 5-8) (adjective)	(3) NBS rating (Worksheet 5-9) (adjective)	(4) Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)	(5) Length of bank (ft)	(6) Study bank height (ft)	(7) Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)
1. --	**Very Low**	**Low**	**0.02**	**71**	**2.7**	**3.834**
2. --	**Moderate**	**Low**	**0.15**	**451**	**1.6**	**108.24**
4. --	**Very High**	**Low**	**0.25**	**24**	**6.2**	**37.2**
6. --	**Low**	**Low**	**0.025**	**354**	**1.2**	**10.62**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						

Sum erosion subtotals in Column (7) for each BEHI/NBS combination	**Total erosion (ft^3/yr)**	**159.894**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}	**Total erosion (yds^3/yr)**	**5.922**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}	**Total erosion (tons/yr)**	**7.699**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}	**Total erosion (tons/yr/ft)**	**0.009**

Stream: **UT15-RTB-P-PE**				Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **740**		
Observers: **RE, CF**			Valley Type:		Date: **2/26/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Low**	**Low**	**0.02**	**519**	**2.1**	**21.798**
2. --	**Moderate**	**Low**	**0.15**	**221**	**1.6**	**53.04**
4. --						**0**
6. --						**0**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**74.838**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**2.772**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**3.603**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.005**

Stream:	**UT1 of UT17 of RTB-P-I**			Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers:	**RE, CF**		Valley Type:		Date: **2/26/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Low**	**Low**	**0.025**	**229**	**1.65**	**9.44625**
2. --	**Moderate**	**Low**	**0.15**	**568**	**1.1**	**93.72**
4. --	**Extreme**	**Low**	**0.4**	**10**	**10**	**40**
6. --	**High**	**Low**	**0.25**	**93**	**5.4**	**125.55**
7. --			**0**			**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**268.71625**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**9.952**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**12.938**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.014**

Stream:	**RTB-T-P**				Location: **A**		
Graph Used:		Stream Type:			Total Bank Length (ft): **900**		
Observers:	**RE, CF**		Valley Type:			Date: **2/27/08**	
(1)		**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)		**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1.	--	**Very Low**	**Low**	**0.02**	**151**	**1.9**	**5.738**
2.	--	**Moderate**	**Low**	**0.15**	**355**	**4.3**	**228.975**
4.	--	**Very High**	**Low**	**0.25**	**48**	**7**	**84**
6.	--	**Low**	**Low**	**0.025**	**310**	**2.5**	**19.375**
7.	--	**High**	**Low**	**0.25**	**36**	**3.8**	**34.2**
8.							**0**
9.							**0**
10.							
11.							
12.							
13.							
14.							
15.							
Sum erosion subtotals in Column (7) for each BEHI/NBS combination						**Total erosion (ft^3/yr)**	**372.288**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}						**Total erosion (yds^3/yr)**	**13.788**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}						**Total erosion (tons/yr)**	**17.925**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}						**Total erosion (tons/yr/ft)**	**0.020**

Stream: **RFCB-P-P**			Location: **A**			
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers: **RE, CF**			Valley Type:		Date: **3/3/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Low**	**Low**	**0.025**	**500**	**1.2**	**15**
2. --	**Moderate**	**Low**	**0.15**	**320**	**3.6**	**172.8**
4. --	**Very Low**	**Low**	**0.02**	**80**	**3.4**	**5.44**
6. --						**0**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**193.24**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**7.157**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**9.304**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.010**

Stream: **RFCB-P-I**				Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers: **RE, CF**			Valley Type:		Date: **3/3/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Low**	**Low**	**0.025**	**665**	**2.1**	**34.9125**
2. --	**Moderate**	**Low**	**0.15**	**185**	**2.4**	**66.6**
4. --	**High**	**Low**	**0.25**	**50**	**10**	**125**
6. --						**0**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**226.5125**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**8.389**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**10.906**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.012**

Stream:	**UT1-RFCB-P-I**			Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers:	**RE, CF**		Valley Type:		Date: **3/5/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Low**	**Low**	**0.025**	**139**	**2.3**	**7.9925**
2. --	**Moderate**	**Low**	**0.15**	**180**	**1.8**	**48.6**
4. --	**High**	**Low**	**0.25**	**581**	**3.2**	**464.8**
6. --						**0**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**521.3925**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**19.311**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**25.104**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.028**

Stream:	**UT4-RFCB-P-E**			Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **500**		
Observers:	**RE, CF**		Valley Type:		Date: **3/3/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Low**	**Low**	**0.025**	**385**	**1.2**	**11.55**
2. --	**Moderate**	**Low**	**0.15**	**115**	**3.2**	**55.2**
4. --						**0**
6. --						**0**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**66.75**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**2.472**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**3.214**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.006**

Stream: **RFCB-T-P**				Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers: **RE, CF**			Valley Type:		Date: **3/3/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Low**	**Low**	**0.025**	**500**	**2.1**	**26.25**
2. --	**Moderate**	**Low**	**0.15**	**400**	**2**	**120**
4. --						**0**
6. --						**0**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**146.25**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**5.417**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**7.042**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.008**

Stream:	**UT1-RFCB-T-P**		Location: **A**			
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers:	**RE, CF**		Valley Type:		Date: **3/3/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Low**	**Low**	**0.025**	**380**	**2**	**19**
2. --	**Moderate**	**Low**	**0.15**	**200**	**6**	**180**
4. --	**Very Low**	**Low**	**0.02**	**320**	**1.4**	**8.96**
6. --						**0**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**207.96**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**7.702**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**10.013**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.011**

Stream:	**UT2-RFCB-T-I**			Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers:	**RE, CF**		Valley Type:		Date: **3/3/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Low**	**Low**	**0.025**	**782**	**2.2**	**43.01**
2. --	**Moderate**	**Low**	**0.15**	**118**	**1.4**	**24.78**
4. --						**0**
6. --						**0**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**67.79**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**2.511**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**3.264**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.004**

Stream: **LFCB-P-I**				Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers: **RE, CF**			Valley Type:		Date: **3/5/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Low**	**Low**	**0.025**	**632**	**1.8**	**28.44**
2. --	**Moderate**	**Low**	**0.15**	**240**	**3.4**	**122.4**
4. --	**Very Low**	**Low**	**0.02**	**28**	**1.8**	**1.008**
6. --						**0**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**151.848**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**5.624**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**7.311**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.008**

Stream: **LFCB-T-I**				Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers: **RE, CF**			Valley Type:		Date: **3/5/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Low**	**Low**	**0.025**	**659**	**2.1**	**34.5975**
2. --	**Moderate**	**Low**	**0.15**	**102**	**2**	**30.6**
4. --	**High**	**Low**	**0.2**	**139**	**4**	**111.2**
6. --						**0**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**176.3975**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**6.533**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**8.493**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.009**

Stream:	**RFHC-P-I**			Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **839**		
Observers:	**RE, CF**		Valley Type:		Date: **3/3/08**	

(1) Station (ft)	(2) BEHI rating (Worksheet 5-8) (adjective)	(3) NBS rating (Worksheet 5-9) (adjective)	(4) Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)	(5) Length of bank (ft)	(6) Study bank height (ft)	(7) Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)
1. --	Low	Low	0.025	59	1.24	1.829
2. --	Moderate	Low	0.15	402	1.25	75.375
4. --	Very Low	Low	0.02	144	2.7	7.776
6. --	High	Low	0.25	234	4.2	245.7
7. --						0
8.						0
9.						0
10.						
11.						
12.						
13.						
14.						
15.						

Sum erosion subtotals in Column (7) for each BEHI/NBS combination	**Total erosion (ft^3/yr)**	**330.68**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}	**Total erosion (yds^3/yr)**	**12.247**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}	**Total erosion (tons/yr)**	**15.922**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}	**Total erosion (tons/yr/ft)**	**0.019**

Stream:	**RFHC-P-E**				Location: **A**		
Graph Used:		Stream Type:			Total Bank Length (ft): **900**		
Observers:	**RE, CF**		Valley Type:			Date: **3/3/08**	
(1)		**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)		**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1.	--	**Low**	**Low**	**0.025**	**255**	**1.8**	**11.475**
2.	--	**Moderate**	**Low**	**0.15**	**462**	**2**	**138.6**
4.	--	**High**	**Low**	**0.25**	**183**	**2.4**	**109.8**
6.	--			**0**	**0**	**0**	**0**
7.	--						**0**
8.							**0**
9.							**0**
10.							
11.							
12.							
13.							
14.							
15.							
Sum erosion subtotals in Column (7) for each BEHI/NBS combination						**Total erosion (ft^3/yr)**	**259.875**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}						**Total erosion (yds^3/yr)**	**9.625**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}						**Total erosion (tons/yr)**	**12.513**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}						**Total erosion (tons/yr/ft)**	**0.014**

Stream:	**UT1 of RFHC -P-P**				Location: **A**		
Graph Used:		Stream Type:			Total Bank Length (ft): **900**		
Observers:	**RE, AC**		Valley Type:			Date: **2/28/08**	
(1)		**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)		**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1.	--	**Low**	**Low**	**0.025**	**117**	**1.9**	**5.5575**
2.	--	**Moderate**	**Low**	**0.15**	**642**	**2.3**	**221.49**
4.	--	**High**	**Low**	**0.25**	**42**	**5.1**	**53.55**
6.	--	**Very Low**	**Low**	**0.02**	**99**	**3.4**	**6.732**
7.	--						**0**
8.							**0**
9.							**0**
10.							
11.							
12.							
13.							
14.							
15.							
Sum erosion subtotals in Column (7) for each BEHI/NBS combination						**Total erosion (ft^3/yr)**	**287.3295**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}						**Total erosion (yds^3/yr)**	**10.642**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}						**Total erosion (tons/yr)**	**13.834**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}						**Total erosion (tons/yr/ft)**	**0.015**

Stream: **UT1 of RFHC -P-I**				Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **624**		
Observers: **RE, AC**			Valley Type:		Date: **2/28/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Low**	**Low**	**0.025**	**375**	**1.2**	**11.25**
2. --	**Moderate**	**Low**	**0.15**	**201**	**1.8**	**54.27**
4. --	**High**	**Low**	**0.25**	**48**	**2.35**	**28.2**
6. --						**0**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**93.72**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**3.471**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**4.512**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.007**

Stream: **UT1 of RFHC-P-E**				Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **500**		
Observers: **RE, AC**			Valley Type:		Date: **2/28/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Low**	**Low**	**0.025**	**500**	**1.4**	**17.5**
2. --						**0**
4. --						**0**
6. --						**0**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**17.5**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**0.648**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**0.843**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.002**

Stream:	**UT4 of RFHC-P-I**		Location: **A**			
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers:	**RE, CF**		Valley Type:		Date: **2/27/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Low**	**Low**	**0.025**	**245**	**2.1**	**12.8625**
2. --	**Moderate**	**Low**	**0.15**	**485**	**3**	**218.25**
4. --	**Very Low**	**Low**	**0.02**	**105**	**3.5**	**7.35**
6. --	**High**	**Low**	**0.25**	**65**	**8**	**130**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**368.4625**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**13.647**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**17.741**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.020**

Stream:	**RFHC-P-E**				Location: **A**		
Graph Used:		Stream Type:			Total Bank Length (ft): **770**		
Observers:	**RE, CF**		Valley Type:			Date: **3/3/08**	
(1)		**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)		**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1.	--	**Low**	**Low**	**0.025**	**770**	**0.85**	**16.3625**
2.	--						**0**
4.	--						**0**
6.	--			**0**	**0**	**0**	**0**
7.	--						**0**
8.							**0**
9.							**0**
10.							
11.							
12.							
13.							
14.							
15.							
Sum erosion subtotals in Column (7) for each BEHI/NBS combination						**Total erosion (ft^3/yr)**	**16.3625**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}						**Total erosion (yds^3/yr)**	**0.606**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}						**Total erosion (tons/yr)**	**0.788**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}						**Total erosion (tons/yr/ft)**	**0.001**

Stream:	**RFHC-TP1**			Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers:	**RE, CF**		Valley Type:		Date: **2/27/08**	

(1) Station (ft)	(2) BEHI rating (Worksheet 5-8) (adjective)	(3) NBS rating (Worksheet 5-9) (adjective)	(4) Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)	(5) Length of bank (ft)	(6) Study bank height (ft)	(7) Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)
1. --	Low	Low	0.025	200	1.4	7
2. --	Moderate	Low	0.15	313	1.1	51.645
4. --	Very Low	Low	0.02	277	4.1	22.714
6. --	High	Low	0.25	110	3.5	96.25
7. --						0
8.						0
9.						0
10.						
11.						
12.						
13.						
14.						
15.						

Sum erosion subtotals in Column (7) for each BEHI/NBS combination	**Total erosion (ft^3/yr)**	**177.609**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}	**Total erosion (yds^3/yr)**	**6.578**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}	**Total erosion (tons/yr)**	**8.552**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}	**Total erosion (tons/yr/ft)**	**0.010**

Stream:	**RFHC-TP2**			Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers:	**RE, CF**		Valley Type:		Date: **2/27/08**	

(1) Station (ft)	(2) BEHI rating (Worksheet 5-8) (adjective)	(3) NBS rating (Worksheet 5-9) (adjective)	(4) Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)	(5) Length of bank (ft)	(6) Study bank height (ft)	(7) Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)
1. --	Low	Low	0.025	368	2	18.4
2. --	Moderate	Low	0.15	156	5	117
4. --	Very Low	Low	0.02	250	2.7	13.5
6. --	High	Low	0.25	126	6	189
7. --						0
8.						0
9.						0
10.						
11.						
12.						
13.						
14.						
15.						

Sum erosion subtotals in Column (7) for each BEHI/NBS combination	**Total erosion (ft^3/yr)**	**337.9**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}	**Total erosion (yds^3/yr)**	**12.515**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}	**Total erosion (tons/yr)**	**16.269**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}	**Total erosion (tons/yr/ft)**	**0.018**

Stream:	**UT1 of RFHC -T-P**				Location: **A**		
Graph Used:		Stream Type:			Total Bank Length (ft): **900**		
Observers:	**RE, AC**		Valley Type:			Date: **2/28/08**	
(1)		**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)		**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1.	--	**Low**	**Low**	**0.025**	**228**	**1.9**	**10.83**
2.	--	**Very High**	**Low**	**0.35**	**147**	**10**	**514.5**
4.	--	**High**	**Low**	**0.25**	**231**	**3**	**173.25**
6.	--	**Very Low**	**Low**	**0.02**	**294**	**1.2**	**7.056**
7.	--						**0**
8.							**0**
9.							**0**
10.							
11.							
12.							
13.							
14.							
15.							
Sum erosion subtotals in Column (7) for each BEHI/NBS combination						**Total erosion (ft^3/yr)**	**705.636**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}						**Total erosion (yds^3/yr)**	**26.135**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}						**Total erosion (tons/yr)**	**33.975**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}						**Total erosion (tons/yr/ft)**	**0.038**

Stream:	**LFHC-P-P**			Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers:	**RE, CF**		Valley Type:		Date: **3/3/08**	

(1) Station (ft)	(2) BEHI rating (Worksheet 5-8) (adjective)	(3) NBS rating (Worksheet 5-9) (adjective)	(4) Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)	(5) Length of bank (ft)	(6) Study bank height (ft)	(7) Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)
1. --	**Low**	**Low**	**0.025**	**310**	**1.6**	**12.4**
2. --	**Moderate**	**Low**	**0.15**	**358**	**2**	**107.4**
4. --	**High**	**Low**	**0.25**	**132**	**4.2**	**138.6**
6. --	**Very Low**	**Low**	**0.02**	**100**	**1.8**	**3.6**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						

Sum erosion subtotals in Column (7) for each BEHI/NBS combination	**Total erosion (ft^3/yr)**	**262**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}	**Total erosion (yds^3/yr)**	**9.704**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}	**Total erosion (tons/yr)**	**12.615**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}	**Total erosion (tons/yr/ft)**	**0.014**

Stream: **LFHC-P-I**				Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers: **RE, CF**			Valley Type:		Date: **3/3/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Low**	**Low**	**0.025**	**605**	**2.7**	**40.8375**
2. --	**Moderate**	**Low**	**0.15**	**180**	**2.2**	**59.4**
4. --	**High**	**Low**	**0.25**	**75**	**12**	**225**
6. --	**Very Low**	**Low**	**0.02**	**40**	**1.5**	**1.2**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**326.4375**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**12.090**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**15.717**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.017**

Stream:	**UT1 LFHC-P-P**			Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **910**		
Observers:	**RE, CF**		Valley Type:		Date: **3/4/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Low**	**Low**	**0.025**	**815**	**1.2**	**24.45**
2. --	**Moderate**	**Low**	**0.15**	**95**	**1.8**	**25.65**
4. --						**0**
6. --						**0**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**50.1**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**1.856**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**2.412**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.003**

Stream:	**UT1 of LFHC-P-I**				Location: **A**		
Graph Used:		Stream Type:			Total Bank Length (ft): **900**		
Observers:	**RE, CF**		Valley Type:			Date: **3/6/08**	
(1)		**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)		**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1.	--	**Low**	**Low**	**0.025**	**700**	**1.2**	**21**
2.	--	**Moderate**	**Low**	**0.15**	**200**	**2.1**	**63**
4.	--						**0**
6.	--						**0**
7.	--						**0**
8.							**0**
9.							**0**
10.							
11.							
12.							
13.							
14.							
15.							
Sum erosion subtotals in Column (7) for each BEHI/NBS combination						**Total erosion (ft^3/yr)**	**84**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}						**Total erosion (yds^3/yr)**	**3.111**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}						**Total erosion (tons/yr)**	**4.044**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}						**Total erosion (tons/yr/ft)**	**0.004**

Stream: **UT2 of UT1 LFHC-P-I**				Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers: **RE, CF**			Valley Type:		Date: **3/4/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Low**	**Low**	**0.025**	**145**	**1.2**	**4.35**
2. --	**Moderate**	**Low**	**0.15**	**755**	**3**	**339.75**
4. --						**0**
6. --						**0**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**344.1**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**12.744**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**16.568**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.018**

Stream:	**UT10-LFHC-P-P**			Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers:	**RE, CF**		Valley Type:		Date: **3/6/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Low**	**Low**	**0.025**	**540**	**0.9**	**12.15**
2. --	**Moderate**	**Low**	**0.15**	**195**	**2.8**	**81.9**
4. --	**Very Low**	**Low**	**0.02**	**55**	**2**	**2.2**
6. --	**High**	**Low**	**0.25**	**110**	**12**	**330**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**426.25**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**15.787**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**20.523**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.023**

Stream:	**UT1 UT10 LFHC PI**			Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers:	**RE, CF**		Valley Type:		Date: **3/6/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Very Low**	**Low**	**0.02**	**350**	**1.8**	**12.6**
2. --	**Mod**	**Low**	**0.15**	**550**	**1.4**	**115.5**
4. --						**0**
6. --						**0**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**128.1**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**4.744**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**6.168**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.007**

Stream: **UT1 UT1 UT10 LFHC PI**			Location: **A**			
Graph Used:		Stream Type:		Total Bank Length (ft): **674**		
Observers: **RE, CF**			Valley Type:		Date: **3/6/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Low**	**Low**	**0.025**	**674**	**1.8**	**30.33**
2. --						**0**
4. --						**0**
6. --						**0**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**30.33**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**1.123**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**1.460**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.002**

Stream: **LFHC-T-P1**				Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers: **RE, CF**			Valley Type:		Date: **3/4/08**	

(1) Station (ft)	(2) BEHI rating (Worksheet 5-8) (adjective)	(3) NBS rating (Worksheet 5-9) (adjective)	(4) Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)	(5) Length of bank (ft)	(6) Study bank height (ft)	(7) Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)
1. --	Very Low	Low	0.02	40	1.5	1.2
2. --	Moderate	Low	0.15	190	2.2	62.7
4. --	High	Low	0.25	70	8	140
6. --	Low	Low	0.025	600	1.5	22.5
7. --						0
8.						0
9.						0
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**226.4**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**8.385**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**10.901**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.012**

Stream:	**LFHC-T-P2**			Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **1000**		
Observers:	**RE, CF**		Valley Type:		Date: **3/3/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Low**	**Low**	**0.025**	**512**	**1.9**	**24.32**
2. --	**Moderate**	**Low**	**0.15**	**488**	**1.4**	**102.48**
4. --						**0**
6. --						**0**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**126.8**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**4.696**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**6.105**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.006**

Stream: **UT1 LFHC-T-P**			Location: **A**			
Graph Used:		Stream Type:		Total Bank Length (ft): **330**		
Observers: **RE, CF**			Valley Type:		Date: **3/4/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Very Low**	**Low**	**0.02**	**60**	**1.2**	**1.44**
2. --	**Moderate**	**Low**	**0.15**	**160**	**3**	**72**
4. --	**High**	**Low**	**0.25**	**110**	**9**	**247.5**
6. --						**0**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**320.94**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**11.887**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**15.453**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.047**

Stream: **PRC-P-I**				Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers: **RE, AC**			Valley Type:		Date: **2/28/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Low**	**Low**	**0.025**	**177**	**1.5**	**6.6375**
2. --	**Moderate**	**Low**	**0.15**	**230**	**1.3**	**44.85**
4. --	**High**	**Low**	**0.25**	**48**	**5.5**	**66**
6. --	**Very Low**	**Low**	**0.02**	**445**	**3.2**	**28.48**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**145.9675**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**5.406**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**7.028**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.008**

Stream:	**UT1 of UT1 of PRC-P-E**			Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers:	**RE, AC, CF**		Valley Type:		Date: **2/29/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Low**	**Low**	**0.025**	**690**	**1.7**	**29.325**
2. --	**Moderate**	**Low**	**0.15**	**210**	**2.4**	**75.6**
4. --						**0**
6. --						**0**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**104.925**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**3.886**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**5.052**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.006**

Stream: **PRC-T-P**				Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers: **RE, CF**			Valley Type:		Date: **2/29/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Low**	**Low**	**0.025**	**270**	**1.7**	**11.475**
2. --	**Moderate**	**Low**	**0.15**	**200**	**3.6**	**108**
4. --	**High**	**Low**	**0.25**	**50**	**8.2**	**102.5**
6. --	**Very Low**	**Low**	**0.02**	**380**	**3.7**	**28.12**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**250.095**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**9.263**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**12.042**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.013**

Stream:	**UT5 PRC-P-I**				Location: **A**		
Graph Used:		Stream Type:			Total Bank Length (ft): **900**		
Observers:	**RE, AC, CF**		Valley Type:			Date: **2/26/08**	
(1)		**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)		**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1.	--	**Low**	**Low**	**0.025**	**426**	**1.1**	**11.715**
2.	--	**Moderate**	**Low**	**0.15**	**201**	**1.6**	**48.24**
4.	--	**Very Low**	**Low**	**0.02**	**219**	**1.99**	**8.7162**
6.	--	**Very High**	**Low**	**0.3**	**54**	**6**	**97.2**
7.	--						**0**
8.							**0**
9.							**0**
10.							
11.							
12.							
13.							
14.							
15.							
Sum erosion subtotals in Column (7) for each BEHI/NBS combination						**Total erosion (ft^3/yr)**	**165.8712**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}						**Total erosion (yds^3/yr)**	**6.143**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}						**Total erosion (tons/yr)**	**7.986**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}						**Total erosion (tons/yr/ft)**	**0.009**

Stream: **UTPC-P-I**				Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers: **RE, CF**			Valley Type:		Date: **2/29/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Low**	**Low**	**0.025**	**275**	**1.4**	**9.625**
2. --	**Moderate**	**Low**	**0.15**	**345**	**1.9**	**98.325**
4. --	**High**	**Low**	**0.25**	**185**	**2.6**	**120.25**
6. --	**Very Low**	**Low**	**0.02**	**95**	**4.2**	**7.98**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**236.18**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**8.747**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**11.372**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.013**

Stream:	**UTPC-P-E**				Location: **A**		
Graph Used:		Stream Type:			Total Bank Length (ft): **900**		
Observers:	**RE, CF**		Valley Type:			Date: **2/29/08**	
(1)		**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)		**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1.	--	**Low**	**Low**	**0.025**	**655**	**1.8**	**29.475**
2.	--	**Moderate**	**Low**	**0.15**	**180**	**2.3**	**62.1**
4.	--	**High**	**Low**	**0.25**	**65**	**5.3**	**86.125**
6.	--						**0**
7.	--						**0**
8.							**0**
9.							**0**
10.							
11.							
12.							
13.							
14.							
15.							
Sum erosion subtotals in Column (7) for each BEHI/NBS combination						**Total erosion (ft^3/yr)**	**177.7**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}						**Total erosion (yds^3/yr)**	**6.581**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}						**Total erosion (tons/yr)**	**8.556**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}						**Total erosion (tons/yr/ft)**	**0.010**

Stream:	**UTPC-T-I**				Location: **A**		
Graph Used:		Stream Type:			Total Bank Length (ft): **900**		
Observers:	**RE, CF**		Valley Type:			Date: **2/29/08**	
(1)		**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)		**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1.	--	**Low**	**Low**	**0.025**	**383**	**2.1**	**20.1075**
2.	--	**Moderate**	**Low**	**0.15**	**377**	**3.2**	**180.96**
4.	--	**High**	**Low**	**0.25**	**40**	**4.9**	**49**
6.	--	**Very Low**	**Low**	**0.02**	**20**	**1.3**	**0.52**
7.	--	**Extreme**	**Low**	**0.4**	**80**	**20**	**640**
8.							**0**
9.							**0**
10.							
11.							
12.							
13.							
14.							
15.							
Sum erosion subtotals in Column (7) for each BEHI/NBS combination						**Total erosion (ft^3/yr)**	**890.5875**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}						**Total erosion (yds^3/yr)**	**32.985**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}						**Total erosion (tons/yr)**	**42.880**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}						**Total erosion (tons/yr/ft)**	**0.048**

Stream: **UT5 MC-P-P**			Location: **A**			
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers: **RE, CF**			Valley Type:		Date: **3/5/08**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Low**	**Low**	**0.025**	**435**	**0.9**	**9.7875**
2. --	**Moderate**	**Low**	**0.15**	**465**	**3.1**	**216.225**
4. --						**0**
6. --						**0**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**226.0125**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**8.371**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**10.882**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.012**

Stream:	**UT5 MC-P-I**			Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **900**		
Observers:	**RE, CF**		Valley Type:		Date: **3/5/08**	

(1) Station (ft)	(2) BEHI rating (Worksheet 5-8) (adjective)	(3) NBS rating (Worksheet 5-9) (adjective)	(4) Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)	(5) Length of bank (ft)	(6) Study bank height (ft)	(7) Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)
1. --	**Low**	**Low**	**0.025**	**500**	**1.4**	**17.5**
2. --	**Moderate**	**Low**	**0.15**	**400**	**2.6**	**156**
4. --						**0**
6. --						**0**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						

Sum erosion subtotals in Column (7) for each BEHI/NBS combination	**Total erosion (ft^3/yr)**	**173.5**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}	**Total erosion (yds^3/yr)**	**6.426**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}	**Total erosion (tons/yr)**	**8.354**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}	**Total erosion (tons/yr/ft)**	**0.009**

Stream:	**UT5 MC-T-P**				Location: **A**		
Graph Used:		Stream Type:			Total Bank Length (ft): **900**		
Observers:	**RE, CF**		Valley Type:			Date: **3/5/08**	
(1)		**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)		**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1.	--	**Low**	**Low**	**0.025**	**654**	**1.1**	**17.985**
2.	--	**Moderate**	**Low**	**0.15**	**246**	**1.25**	**46.125**
4.	--						**0**
6.	--						**0**
7.	--						**0**
8.							**0**
9.							**0**
10.							
11.							
12.							
13.							
14.							
15.							
Sum erosion subtotals in Column (7) for each BEHI/NBS combination						**Total erosion (ft^3/yr)**	**64.11**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}						**Total erosion (yds^3/yr)**	**2.374**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}						**Total erosion (tons/yr)**	**3.087**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}						**Total erosion (tons/yr/ft)**	**0.003**

PROPOSED MITIGATION CHANNELS

Stream: **RFHC A**				Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **1026**		
Observers: **CM**			Valley Type:		Date: **10/7**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --	**Very Low**	**Low**	**0.025**	**666**	**1**	**16.65**
2. --	**Moderate**	**Low**	**0.15**	**288**	**1.34**	**57.888**
4. --	**High**	**Low**	**0.25**	**72**	**4.5**	**81**
6. --						**0**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**155.538**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**5.761**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**7.489**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.007**

Stream:	**RFHC B1**			Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **1124**		
Observers:	**CM**		Valley Type:		Date: **10/7**	

(1) Station (ft)	(2) BEHI rating (Worksheet 5-8) (adjective)	(3) NBS rating (Worksheet 5-9) (adjective)	(4) Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)	(5) Length of bank (ft)	(6) Study bank height (ft)	(7) Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)
1. --	Very Low	Low	0.025	28	3.82	2.674
2. --	Moderate	Low	0.15	464	3.82	265.872
4. --	Low	Low	0.02	580	3.82	44.312
6. --	High	Low	0.25	52	3.8	49.4
7. --						0
8.						0
9.						0
10.						
11.						
12.						
13.						
14.						
15.						

Sum erosion subtotals in Column (7) for each BEHI/NBS combination	**Total erosion (ft^3/yr)**	**362.258**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}	**Total erosion (yds^3/yr)**	**13.417**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}	**Total erosion (tons/yr)**	**17.442**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}	**Total erosion (tons/yr/ft)**	**0.016**

Stream:	**RFHC D**			Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **772**		
Observers:	**CM**		Valley Type:		Date: **10/7**	

(1) Station (ft)	(2) BEHI rating (Worksheet 5-8) (adjective)	(3) NBS rating (Worksheet 5-9) (adjective)	(4) Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)	(5) Length of bank (ft)	(6) Study bank height (ft)	(7) Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)
1. --						**0**
2. --	**Moderate**	**Low**	**0.15**	**143**	**1.75**	**37.5375**
4. --	**Low**	**Low**	**0.02**	**164**	**1.5**	**4.92**
6. --	**High**	**Low**	**0.25**	**465**	**2.5**	**290.625**
7. --						**0**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						

Sum erosion subtotals in Column (7) for each BEHI/NBS combination	**Total erosion (ft^3/yr)**	**333.0825**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}	**Total erosion (yds^3/yr)**	**12.336**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}	**Total erosion (tons/yr)**	**16.037**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}	**Total erosion (tons/yr/ft)**	**0.021**

Stream:	**LFHC**			Location: **A**		
Graph Used:		Stream Type:		Total Bank Length (ft): **896**		
Observers:	**CM**		Valley Type:		Date: **10/7**	
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Station (ft)	**BEHI rating (Worksheet 5-8) (adjective)**	**NBS rating (Worksheet 5-9) (adjective)**	**Bank erosion rate (Figure 5-38 or 5-39) (ft/yr)**	**Length of bank (ft)**	**Study bank height (ft)**	**Erosion subtotal [(4)X(5)X(6)] (ft^3/yr)**
1. --						**0**
2. --	**Moderate**	**Low**	**0.15**	**140**	**3.28**	**68.88**
4. --	**Low**	**Low**	**0.02**	**406**	**2**	**16.24**
6. --	**High**	**Low**	**0.25**	**90**	**3.5**	**78.75**
7. --	**Very Low**	**Low**	**0.015**	**260**	**1.5**	**5.85**
8.						**0**
9.						**0**
10.						
11.						
12.						
13.						
14.						
15.						
Sum erosion subtotals in Column (7) for each BEHI/NBS combination					**Total erosion (ft^3/yr)**	**169.72**
Convert erosion in ft^3/yr to yds^3/yr {divide Total erosion (ft^3/yr) by 27}					**Total erosion (yds^3/yr)**	**6.286**
Convert erosion in yds^3/yr to tons/yr {multiply Total erosion (yds^3/yr) by 1.3}					**Total erosion (tons/yr)**	**8.172**
Calculate erosion per unit length of channel {divide Total erosion (tons/yr) by total length of stream (ft) surveyed}					**Total erosion (tons/yr/ft)**	**0.009**

APPENDIX E

GEOMORPHIC ASSESSMENT DATA

Proposed Impact Geomorphology
Profiles and Cross-Sections

Existing Conditions for Ruth Trace Branch and Tributaries

Stream Segment		RTBTP	RTBPP	RTBPI	UT15RTB	UT1UT17RTB
Rosgen Stream Type		F4/1b	G3/1a	A4	A4a+	A4
Drainage Area (sq mi)		0.49	0.26	0.21	0.03	0.05
Reach Length Surveyed (ft)		494.1	543.4	541.7	408.9	500.6
Dimension	Bankfull Width (ft)	14.1	12.9	10.3	5.3	4.6
	Bankfull Mean Depth (ft)	0.7	1.4	0.9	0.3	0.8
	Width/Depth Ratio	18.1	9.6	11.3	16.0	5.8
	Bankfull Area (sq ft)	11.0	17.4	9.4	1.8	3.6
	Bankfull Max Depth (ft)	1.1	2.0	1.5	0.7	1.1
	Width of Floodprone Area (ft)	15.5	17.4	28.3	12.0	14.0
	Entrenchment Ratio	1.1	1.3	2.7	2.2	3.0
	Max Pool Depth (ft)	2.0	1.8	2.2	1.0	1.5
	Ratio of Max Pool Depth to Bankfull Depth	2.5	1.4	2.4	3.1	1.9
	Pool Width (ft)	12.1	11.3	15.0	3.2	7.2
	Ratio of Pool Width to Bankfull Width	0.9	0.9	1.5	0.6	1.6
	Pool to Pool Spacing (ft)	70.6	30.9	35.3	32.8	16.5
	Ratio of Pool to Pool Spacing to Bankfull Width	5.0	2.4	3.4	6.1	3.6
	Bank Height Ratio	4.0	1.9	1.0	2.8	1.0
Pattern	Meander Length (ft)	----	----	----	----	----
	Meander Length Ratio	----	----	----	----	----
	Radius of Curvature (ft)	----	----	----	----	----
	Radius of Curvature Ratio	----	----	----	----	----
	Meander Belt Width (ft)	----	----	----	----	----
	Meander Width Ratio	----	----	----	----	----
	Sinuosity	1.10	1.15	1.12	1.07	1.14
Profile	Valley Slope (ft/ft)	0.0376	0.0405	0.0435	0.1656	0.1030
	WS Slope (ft/ft)	0.0414	0.0465	0.0486	0.1777	0.1170
	Channel Slope (ft/ft)	0.0411	0.0470	0.0477	0.2422	0.1330
	Pool Slope (ft/ft)	0.0161	0.0224	0.0165	NA	0.0315
	Ratio of Pool Slope to WS Slope	0.4	0.5	0.3	NA	0.3

Existing Conditions for Conley Branch and Tributaries

	Stream Segment	RFCBTP	RFCBPP	RFCBPI	UT1RFCBTP	UT1RFCBPI	UT2RFCBPI	UT4RFCBPE	LFCBTI	LFCBPI
	Rosgen Stream Type	B4a	A4/1	A4	A4	A4a+	A4a+	A4a+	A4/1	A4/1a+
	Drainage Area (sq mi)	0.13	0.12	0.05	0.13	0.06	0.06	0.02	0.18	0.08
	Reach Length Surveyed (ft)	492.6	436.6	616.5	550.7	503.9	441.0	236.7	489.8	479.3
Dimension	Bankfull Width (ft)	10.2	8.7	8.2	9.9	4.6	8.3	3.2	11.0	8.1
	Bankfull Mean Depth (ft)	0.6	0.9	0.6	0.6	0.6	0.7	0.4	1.1	0.6
	Width/Depth Ratio	18.2	10.2	14.8	15.6	7.5	11.2	9.3	9.8	12.6
	Bankfull Area (sq ft)	5.7	7.5	4.6	6.3	2.8	6.2	1.1	12.4	5.2
	Bankfull Max Depth (ft)	0.9	1.1	0.6	0.9	0.9	1.1	0.6	1.6	1.0
	Width of Floodprone Area (ft)	11.3	11.7	9.4	12.6	15.4	13.9	10.1	13.4	12.5
	Entrenchment Ratio	1.1	1.3	1.2	1.3	3.4	1.7	3.2	1.2	1.5
	Max Pool Depth (ft)	1.4	1.3	1.3	1.5	1.1	1.2	0.6	1.5	2.0
	Ratio of Max Pool Depth to Bankfull Depth	2.5	1.5	2.3	2.4	1.8	1.6	1.7	1.4	3.0
	Pool Width (ft)	6.7	8.75	4.4	9.5	8.0	7.19	2.4	10.7	4.7
	Ratio of Pool Width to Bankfull Width	0.7	1.0	0.5	1.0	1.7	0.9	0.7	1.0	0.6
	Pool to Pool Spacing (ft)	41.8	52.3	27.0	42.8	31.0	102.1	60.6	81.0	45.7
	Ratio of Pool to Pool Spacing to Bankfull Width	4.1	6.0	3.3	4.3	6.8	12.3	18.8	7.4	5.6
	Bank Height Ratio	4.1	1.5	5.7	4.3	3.8	2.0	1.7	2.0	2.0
Pattern	Meander Length (ft)	----	----	----	----	----	----	----	----	----
	Meander Length Ratio	----	----	----	----	----	----	----	----	----
	Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----
	Radius of Curvature Ratio	----	----	----	----	----	----	----	----	----
	Meander Belt Width (ft)	----	----	----	----	----	----	----	----	----
	Meander Width Ratio	----	----	----	----	----	----	----	----	----
	Sinuosity	1.22	1.12	1.13	1.12	1.11	1.10	1.05	1.08	1.10
Profile	Valley Slope (ft/ft)	0.0412	0.0841	0.1220	0.0778	0.1151	0.1270	0.2626	0.0818	0.1207
	WS Slope (ft/ft)	0.0502	0.0940	0.1378	0.0869	0.1281	0.1397	NA	0.0884	0.1333
	Channel Slope (ft/ft)	0.0499	0.0936	0.1376	0.0870	0.1284	0.1393	0.2705	0.0881	0.1335
	Pool Slope (ft/ft)	0.0108	0.0296	0.0371	0.0303	0.0261	0.0258	NA	0.0301	0.0305
	Ratio of Pool Slope to WS Slope	0.2	0.3	0.3	0.4	0.2	0.2	NA	0.3	0.2

Existing Conditions for Right Fork of Hell Creek and Tributaries

Stream Segment		RFHCTP1	RFHCTP2	RFHCPI	RFHCPE	UT1RFHCTP	UT1RFHCPP	UT1RFHCPI	UT1RFHCPE	UT4RFHCPI	UT10RFHCPI
Rosgen Stream Type		B4a	B4/1a	B4a	A4	A1	B4a	A3a+	A5a+	A4	A4a+
Drainage Area (sq mi)		0.27	0.39	0.02	0.02	0.13	0.09	0.02	0.02	0.17	0.01
Reach Length Surveyed (ft)		484.0	512.7	493.2	599.2	480.5	380.5	351.5	256.7	479.4	260.4
Dimension	Bankfull Width (ft)	8.1	7.2	5.7	4.4	8.1	4.3	5.1	6.8	10.3	7.1
	Bankfull Mean Depth (ft)	1.3	0.4	0.4	0.4	0.8	0.2	0.6	0.4	0.6	0.2
	Width/Depth Ratio	6.1	17.5	14.0	10.7	10.7	19.4	7.8	15.8	16.8	24.4
	Bankfull Area (sq ft)	10.6	2.9	2.3	1.8	6.2	1.0	3.3	2.9	6.3	2.1
	Bankfull Max Depth (ft)	1.7	0.8	0.6	0.6	0.9	0.3	0.9	0.6	1.0	0.4
	Width of Floodprone Area (ft)	13.0	14.2	12.0	8.3	10.1	8.2	7.6	12.6	12.8	8.9
	Entrenchment Ratio	1.6	2.0	2.1	1.9	1.2	1.9	1.5	1.9	1.2	1.3
	Max Pool Depth (ft)	1.4	1.5	1.0	1.0	0.5	0.9	1.0	NA	2.2	0.3
	Ratio of Max Pool Depth to Bankfull Depth	1.0	3.7	2.4	2.4	0.7	4.0	1.6	NA	3.6	1.1
	Pool Width (ft)	0.4	10.7	4.7	6.13	4.3	7.8	6.4	NA	9.9	2.2
	Ratio of Pool Width to Bankfull Width	0.1	1.5	0.8	1.4	0.5	1.8	1.3	NA	1.0	0.3
	Pool to Pool Spacing (ft)	63.3	54.7	34.1	15.1	74.4	66.8	46.7	NA	53.2	NA
	Ratio of Pool to Pool Spacing to Bankfull Width	7.9	7.6	6.0	3.4	9.1	15.5	9.3	NA	5.2	NA
	Bank Height Ratio	1.4	5.2	4.3	3.2	2.4	5.3	1.9	2.8	3.1	3.4
Pattern	Meander Length (ft)	----	----	----	----	----	----	----	----	----	----
	Meander Length Ratio	----	----	----	----	----	----	----	----	----	----
	Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----	----
	Radius of Curvature Ratio	----	----	----	----	----	----	----	----	----	----
	Meander Belt Width (ft)	----	----	----	----	----	----	----	----	----	----
	Meander Width Ratio	----	----	----	----	----	----	----	----	----	----
	Sinuosity	1.12	1.13	1.09	1.08	1.07	1.14	1.11	1.13	1.12	1.11
Profile	Valley Slope (ft/ft)	0.0511	0.0437	0.0616	0.1445	0.0667	0.0413	0.1251	0.2916	0.0676	0.4443
	WS Slope (ft/ft)	0.0570	0.0494	0.0669	0.1554	0.0711	0.0469	0.1386	NA	0.0759	NA
	Channel Slope (ft/ft)	0.0562	0.0493	0.0669	0.1624	0.0707	0.0466	0.1391	0.3005	0.0764	0.4648
	Pool Slope (ft/ft)	0.0140	0.0091	0.048618	0.0128	0.0184	0.0083	0.0531	NA	0.0094	NA
	Ratio of Pool Slope to WS Slope	0.3	0.2	0.7	0.1	0.3	0.2	0.4	NA	0.1	NA

Existing Conditions of Left Fork of Hell Creek and Tributaries

Stream Segment		LFHCTP1	LFHCTP2	LFHCPP	LFHCPI	UT1LFHCTP	UT1LFHCPP	UT1LFHCPI	UT2UT1LFHCPI	UT10LFHCPP	UT1UT10LFHCPI	UT1UT1UT10LFHCPI
Rosgen Stream Type		B4	B4	B4/1a	A4	A4/3	A4/3	A4a+	A4/1a+	B3/4a	A4/1a+	A3a+
Drainage Area (sq mi)		0.50	0.44	0.24	0.09	0.23	0.10	0.07	0.01	0.13	0.02	0.01
Reach Length Surveyed (ft)		460.3	451.7	519.1	503.7	536.2	519.6	452.5	251.5	471.8	365.6	197.3
Dimension	Bankfull Width (ft)	7.0	18.6	10.8	9.1	14.9	9.5	6.7	4.5	7.8	1.8	5.2
	Bankfull Mean Depth (ft)	0.2	1.2	0.8	0.8	0.8	0.5	0.8	0.6	0.5	0.1	0.3
	Width/Depth Ratio	40.8	14.6	13.1	11.8	19.7	19.1	8.6	7.1	15.2	15.4	18.5
	Bankfull Area (sq ft)	1.2	23.5	9.0	7.1	11.3	4.7	5.2	2.8	4.0	0.2	1.5
	Bankfull Max Depth (ft)	0.3	1.8	1.2	1.2	1.0	0.7	1.2	1.0	0.8	0.2	0.4
	Width of Floodprone Area (ft)	22.4	26.2	16.0	16.1	17.3	11.7	12.8	7.6	11.2	5.2	7.7
	Entrenchment Ratio	3.2	1.4	1.5	1.8	1.2	1.2	1.9	1.7	1.4	3.0	1.5
	Max Pool Depth (ft)	3.6	2.2	2.2	1.3	1.4	1.5	1.6	1.0	1.4	0.9	NA
	Ratio of Max Pool Depth to Bankfull Depth	21.1	1.7	2.6	1.6	1.9	3.1	2.1	1.6	2.6	11.8	NA
	Pool Width (ft)	23.8	14.3	8.3	4.7	9.1	5.2	9.1	4.9	8.7	3.7	NA
	Ratio of Pool Width to Bankfull Width	3.4	0.8	0.8	0.5	0.6	0.5	1.4	1.1	1.1	3.5	NA
	Pool to Pool Spacing (ft)	78.9	28.3	40.2	31.6	111.2	21.0	16.1	31.2	48.8	92.6	NA
	Ratio of Pool to Pool Spacing to Bankfull Width	11.3	1.5	3.7	3.5	7.5	2.2	2.4	7.0	6.3	52.9	NA
	Bank Height Ratio	7.6	2.2	1.0	1.0	3.5	4.7	1.0	0.7	2.0	1.2	2.0
Pattern	Meander Length (ft)	----	----	----	----	----	----	----	----	----	----	----
	Meander Length Ratio	----	----	----	----	----	----	----	----	----	----	----
	Radius of Curvature (ft)	----	----	----	----	----	----	----	----	----	----	----
	Radius of Curvature Ratio	----	----	----	----	----	----	----	----	----	----	----
	Meander Belt Width (ft)	----	----	----	----	----	----	----	----	----	----	----
	Meander Width Ratio	----	----	----	----	----	----	----	----	----	----	----
	Sinuosity	1.03	1.06	1.15	1.11	1.06	1.11	1.09	1.09	1.06	1.14	1.05
Profile	Valley Slope (ft/ft)	0.0309	0.0259	0.0485	0.0969	0.0507	0.0840	0.1402	0.3728	0.0763	0.1774	0.4151
	WS Slope (ft/ft)	0.0318	0.0275	0.0558	0.1079	0.0538	0.0929	0.1530	NA	0.0810	0.2030	NA
	Channel Slope (ft/ft)	0.0319	0.0266	0.0552	0.1084	0.0540	0.0926	0.1556	0.3761	0.0810	0.3203	0.4162
	Pool Slope (ft/ft)	0.0170	0.0101	0.0079	0.0113	0.0179	0.0335	0.0410	NA	0.0118	0.0434	NA
	Ratio of Pool Slope to WS Slope	0.5	0.4	0.1	0.1	0.3	0.4	0.3	NA	0.2	0.2	NA

Existing Conditions of Pigeonroost Creek and Tributaries

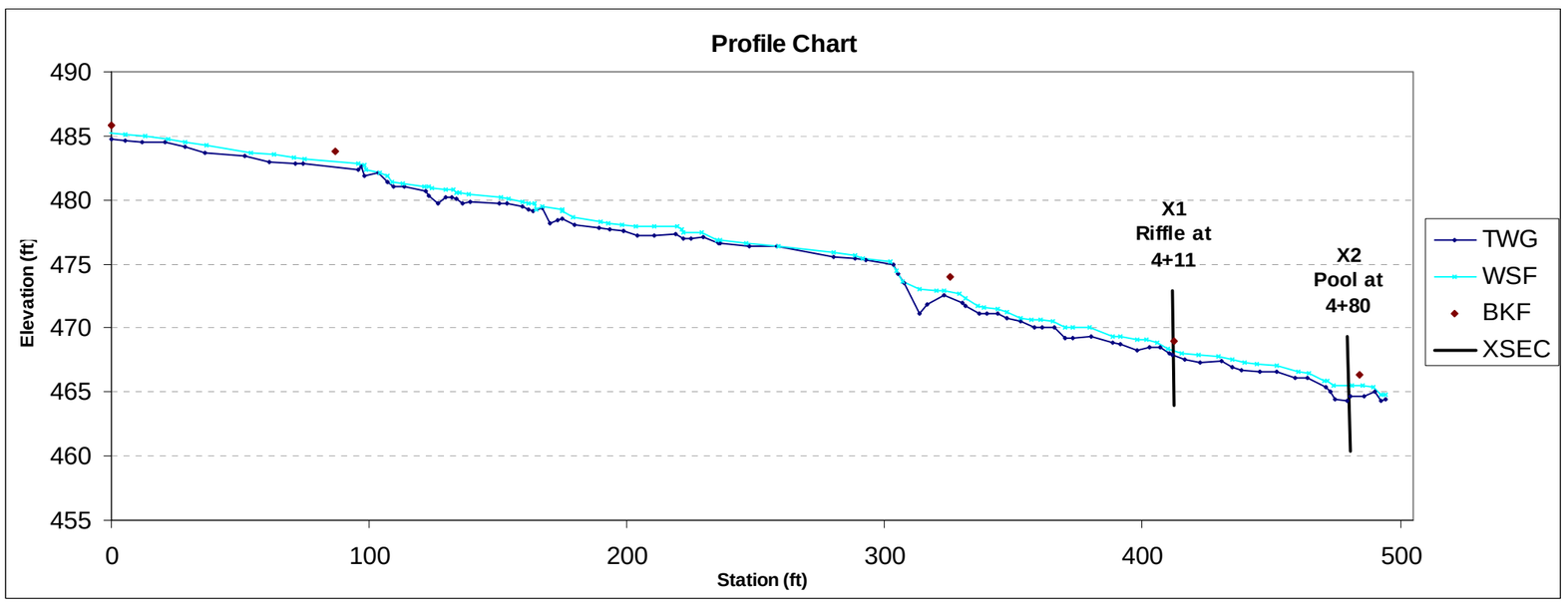
Stream Segment		PRCTP	PRCPI	UT1UT1PRCPE	UT5PRCPI
Rosgen Stream Type		B4/1a	B3/1a	A2a+	B3/1a
Drainage Area (sq mi)		0.38	0.24	0.02	0.10
Reach Length Surveyed (ft)		525.1	495.0	358.6	531.6
Dimension	Bankfull Width (ft)	7.8	2.4	7.1	7.2
	Bankfull Mean Depth (ft)	0.8	0.1	0.6	0.6
	Width/Depth Ratio	9.3	29.1	11.2	12.3
	Bankfull Area (sq ft)	6.6	0.2	4.5	4.2
	Bankfull Max Depth (ft)	1.1	0.2	0.8	0.9
	Width of Floodprone Area (ft)	11.3	4.8	9.1	13.1
	Entrenchment Ratio	1.4	2.0	1.3	1.8
	Max Pool Depth (ft)	1.9	2.1	0.9	1.2
	Ratio of Max Pool Depth to Bankfull Depth	2.2	25.4	1.5	2.0
	Pool Width (ft)	16.9	13.4	3.5	5.6
	Ratio of Pool Width to Bankfull Width	2.2	5.6	0.5	0.8
	Pool to Pool Spacing (ft)	140.5	92.9	104.5	112.2
	Ratio of Pool to Pool Spacing to Bankfull Width	18.0	38.6	14.8	15.6
	Bank Height Ratio	1.7	2.0	2.0	1.6
Pattern	Meander Length (ft)	----	----	----	----
	Meander Length Ratio	----	----	----	----
	Radius of Curvature (ft)	----	----	----	----
	Radius of Curvature Ratio	----	----	----	----
	Meander Belt Width (ft)	----	----	----	----
	Meander Width Ratio	----	----	----	----
	Sinuosity	1.09	1.04	1.05	1.16
Profile	Valley Slope (ft/ft)	0.0516	0.0676	0.3546	0.1065
	WS Slope (ft/ft)	0.0564	0.0706	NA	0.1233
	Channel Slope (ft/ft)	0.0568	0.0711	0.3512	0.1304
	Pool Slope (ft/ft)	0.0085	0.0184	NA	0.0358
	Ratio of Pool Slope to WS Slope	0.2	0.3	NA	0.3

Existing Conditions of Unnamed Tributary of Pigeon Creek (UTPC)

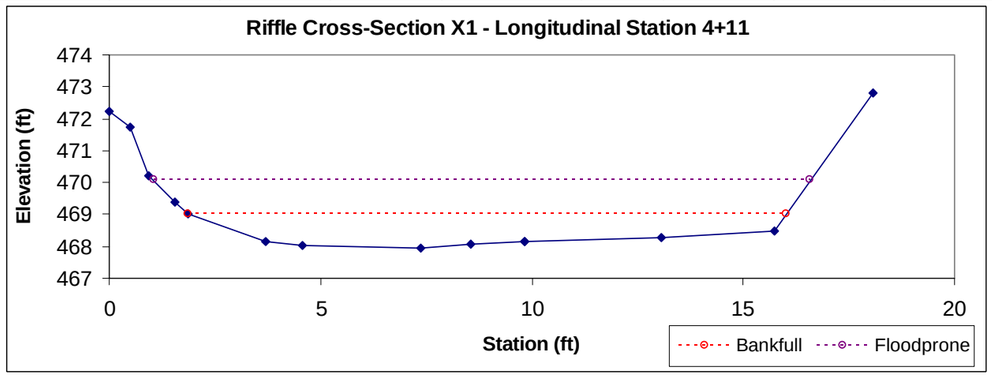
Stream Segment		UTPCTI	UTPCPI	UTPCPE
Rosgen Stream Type		A3/1a+	A4/1a+	A3a+
Drainage Area (sq mi)		0.13	0.08	0.03
Reach Length Surveyed (ft)		455.6	444.5	500.3
Dimension	Bankfull Width (ft)	9.1	5.2	9.0
	Bankfull Mean Depth (ft)	0.7	0.5	0.2
	Width/Depth Ratio	12.9	10.3	36.9
	Bankfull Area (sq ft)	6.4	2.6	2.2
	Bankfull Max Depth (ft)	0.9	0.8	0.4
	Width of Floodprone Area (ft)	10.8	18.7	11.3
	Entrenchment Ratio	1.2	3.6	1.3
	Max Pool Depth (ft)	1.3	1.5	0.6
	Ratio of Max Pool Depth to Bankfull Depth	1.9	2.9	2.6
	Pool Width (ft)	7.8	7.2	3.2
	Ratio of Pool Width to Bankfull Width	0.9	1.4	0.4
	Pool to Pool Spacing (ft)	19.8	46.3	31.3
	Ratio of Pool to Pool Spacing to Bankfull Width	2.2	9.0	3.5
	Bank Height Ratio	2.0	1.5	3.2
Pattern	Meander Length (ft)	----	----	----
	Meander Length Ratio	----	----	----
	Radius of Curvature (ft)	----	----	----
	Radius of Curvature Ratio	----	----	----
	Meander Belt Width (ft)	----	----	----
	Meander Width Ratio	----	----	----
	Sinuosity	1.15	1.17	1.10
Profile	Valley Slope (ft/ft)	0.1012	0.1162	0.1913
	WS Slope (ft/ft)	0.1161	0.1355	0.2113
	Channel Slope (ft/ft)	0.1152	0.1353	0.2914
	Pool Slope (ft/ft)	0.0160	0.0290	0.0676
	Ratio of Pool Slope to WS Slope	0.1	0.2	0.3

Existing Conditions of Unnamed Tributary 5 of Miller Creek

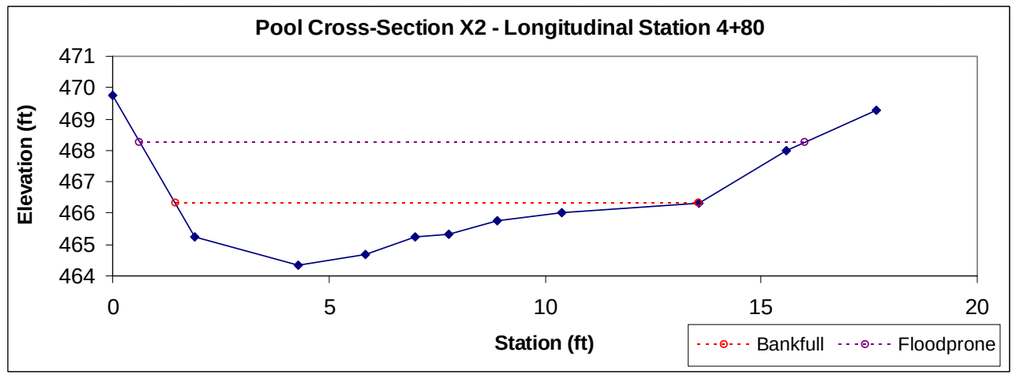
Stream Segment		UT5MCTP	UT5MCPP	UT5MCPI
Rosgen Stream Type		B3a	B4a	A4a+
Drainage Area (sq mi)		0.11	0.06	0.02
Reach Length Surveyed (ft)		507.9	423.7	232.1
Dimension	Bankfull Width (ft)	8.9	7.8	1.8
	Bankfull Mean Depth (ft)	0.4	0.6	0.3
	Width/Depth Ratio	21.3	13.9	6.2
	Bankfull Area (sq ft)	3.7	4.4	0.5
	Bankfull Max Depth (ft)	0.8	0.7	0.5
	Width of Floodprone Area (ft)	16.9	11.2	8.7
	Entrenchment Ratio	1.9	1.4	4.8
	Max Pool Depth (ft)	1.0	1.6	0.9
	Ratio of Max Pool Depth to Bankfull Depth	2.3	2.8	3.0
	Pool Width (ft)	7.2	6.6	2.1
	Ratio of Pool Width to Bankfull Width	0.8	0.9	1.1
	Pool to Pool Spacing (ft)	35.3	88.2	25.1
	Ratio of Pool to Pool Spacing to Bankfull Width	4.0	11.3	13.8
	Bank Height Ratio	2.8	2.8	1.7
Pattern	Meander Length (ft)	----	----	----
	Meander Length Ratio	----	----	----
	Radius of Curvature (ft)	----	----	----
	Radius of Curvature Ratio	----	----	----
	Meander Belt Width (ft)	----	----	----
	Meander Width Ratio	----	----	----
	Sinuosity	1.13	1.09	1.07
Profile	Valley Slope (ft/ft)	0.0745	0.1055	0.2788
	WS Slope (ft/ft)	0.0844	0.1154	0.2984
	Channel Slope (ft/ft)	0.0843	0.1169	0.2978
	Pool Slope (ft/ft)	0.0275	0.0682	0.0344
	Ratio of Pool Slope to WS Slope	0.3	0.6	0.1



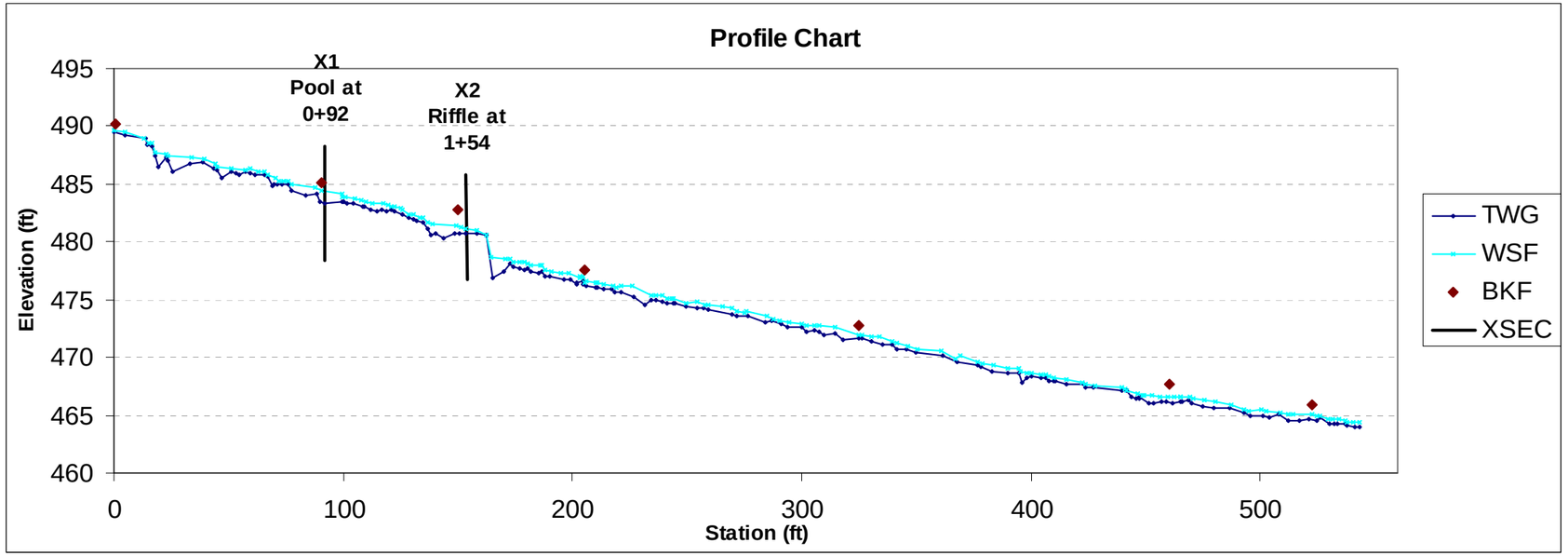
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	F4/1b	11.0	14.1	0.8	1.1	18.1	4.0	1.1	469.0	472.2



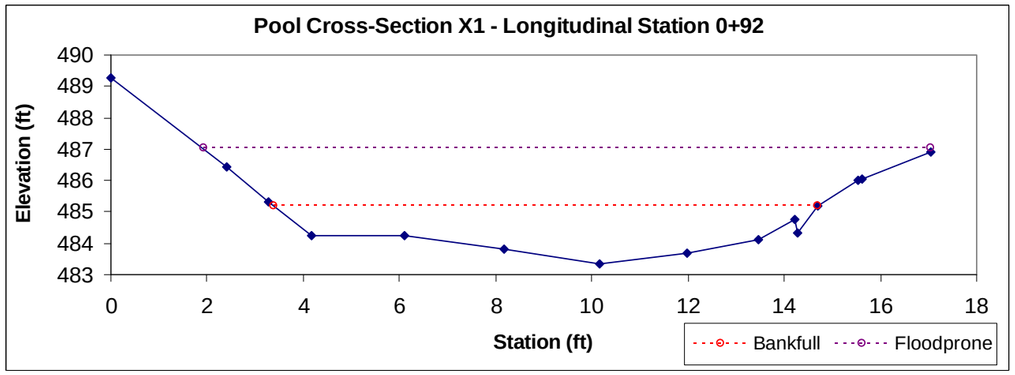
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	F4/1b	10.9	12.1	0.9	2.0	13.4	1.9	1.3	466.3	468.0



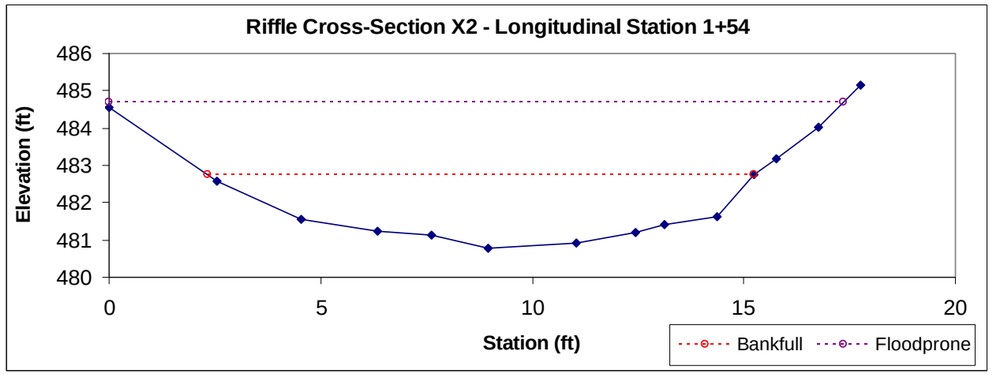
Ruth Trace Branch
Temporary Perennial
(RTBTP)
Profile and Cross-section Data



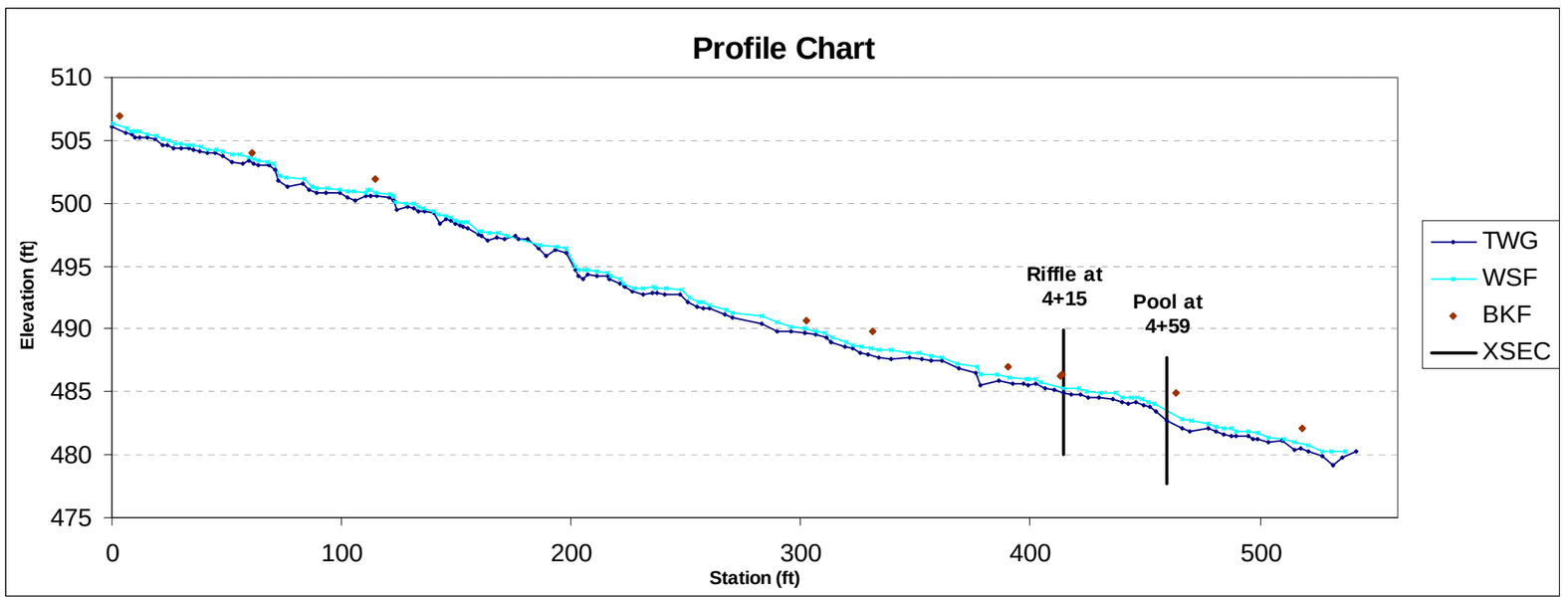
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	G3/1a	13.4	11.3	1.2	1.8	9.6	1.9	1.3	485.2	486.9



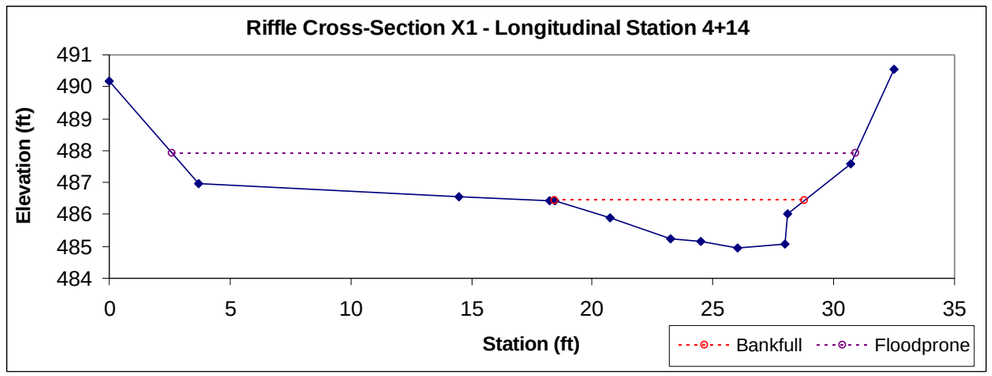
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	G3/1a	17.4	12.9	1.4	2.0	9.6	1.9	1.3	482.7	484.6



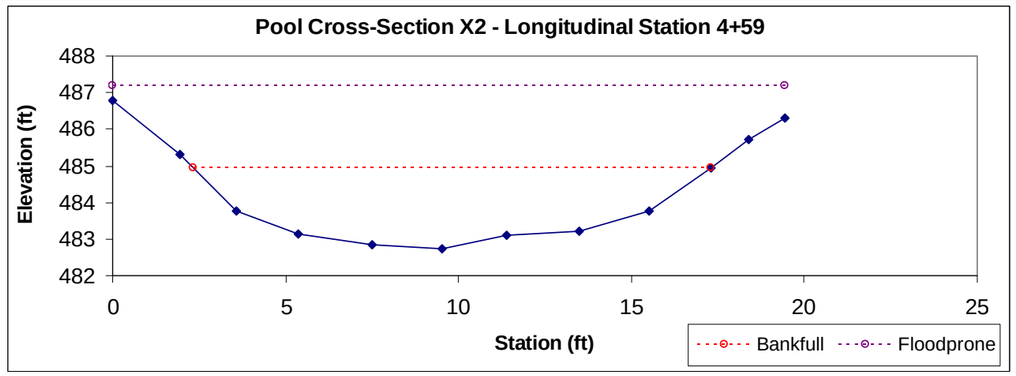
Ruth Trace Branch
Permanent Perennial
(RTBPP)
Profile and Cross-section Data



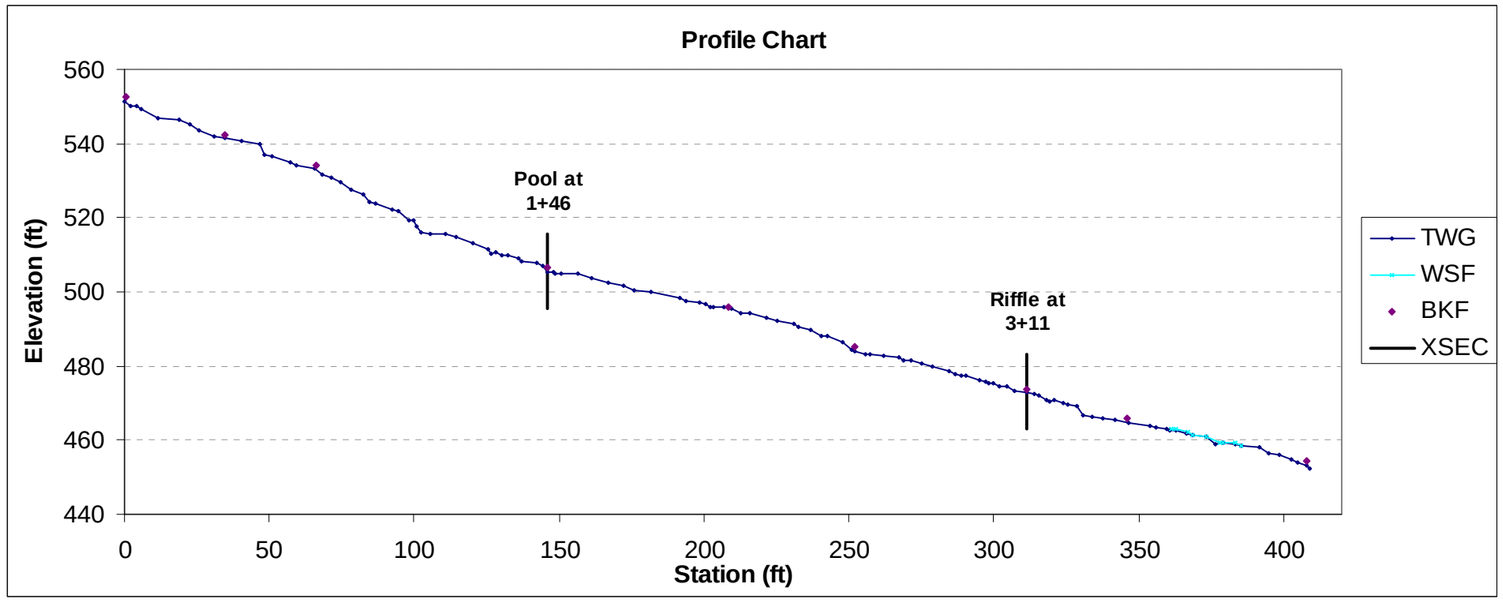
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A4	9.4	10.3	0.9	1.5	11.3	1.0	2.7	486.4	486.4



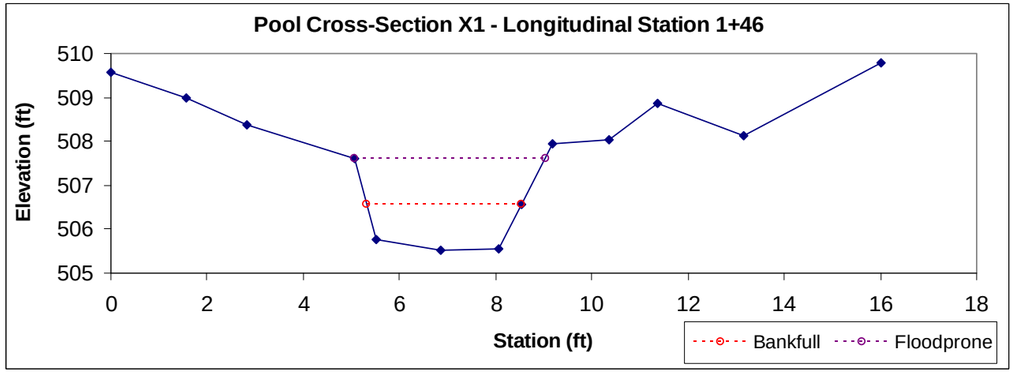
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A4	23.7	15.0	1.6	2.2	9.5	1.6	1.3	485.0	486.3



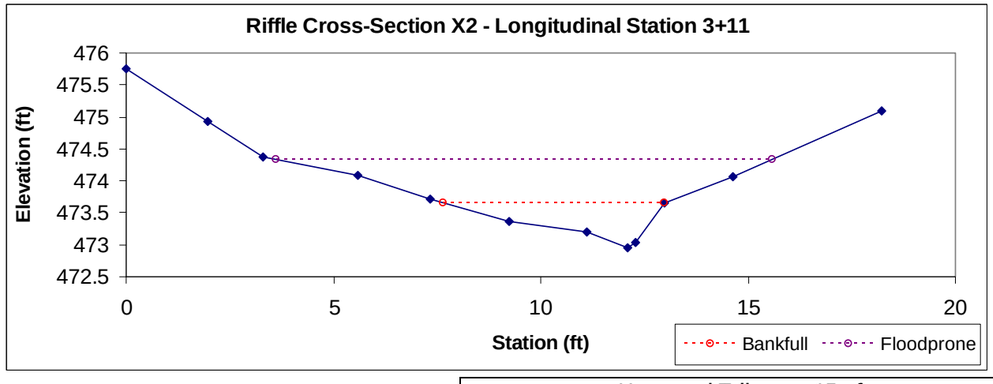
Ruth Trace Branch
Permanent Intermittent
(RTBPI)
Profile and Cross-section Data



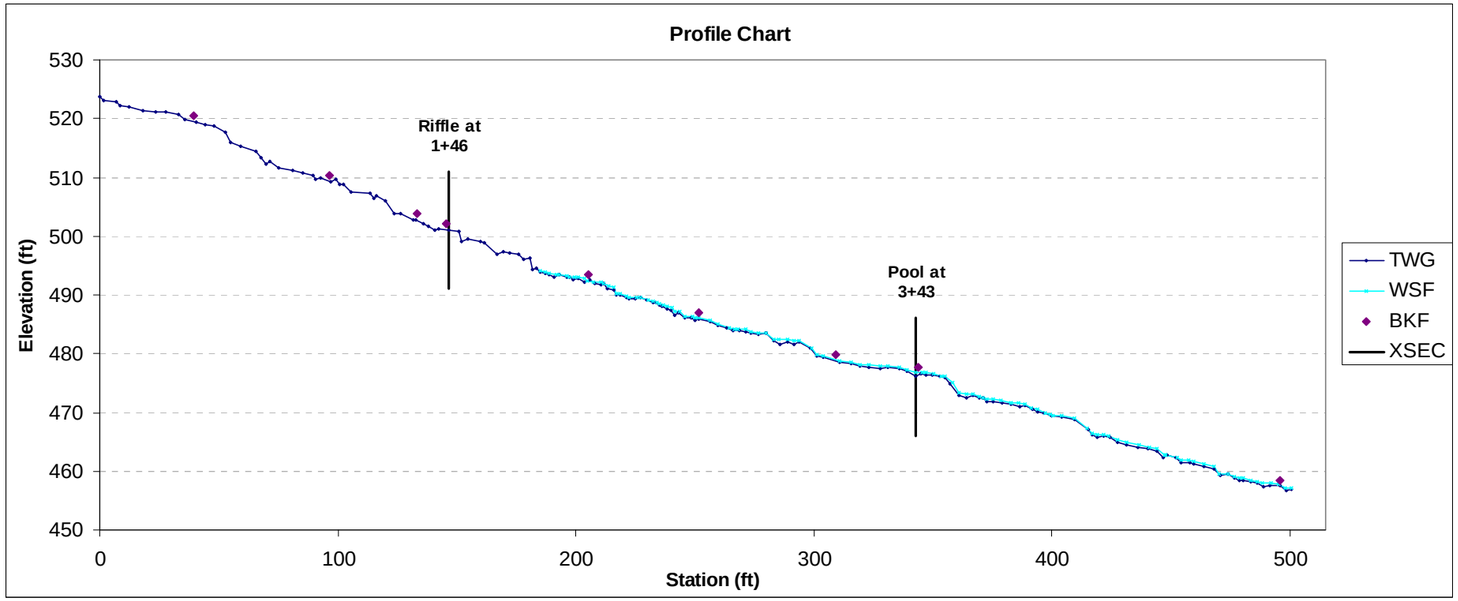
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A4a+	2.8	3.2	0.9	1.1	3.7	2.0	1.2	506.6	507.6



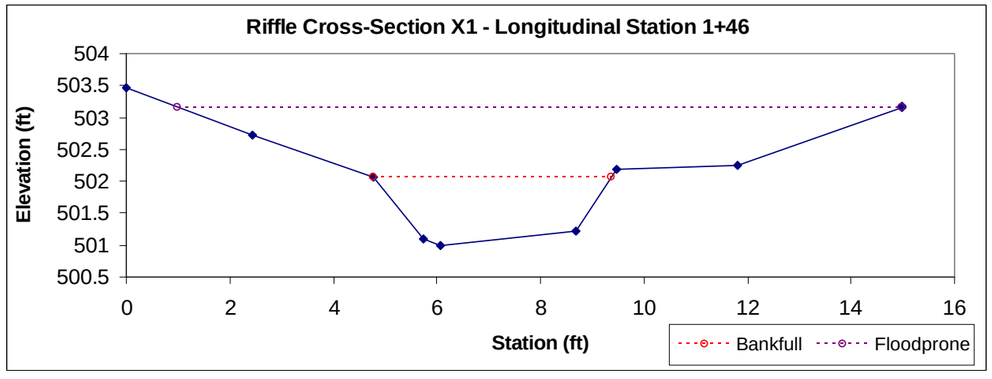
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A4a+	1.8	5.3	0.3	0.7	16.0	2.8	2.2	473.7	474.9



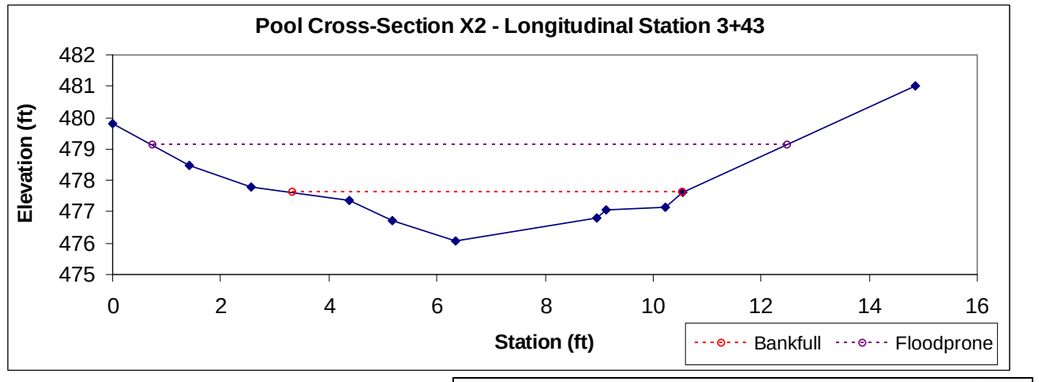
Unnamed Tributary 15 of
Ruth Trace Branch
Permanent Ephemeral
(UT15RTBPE)
Profile and Cross-section Data



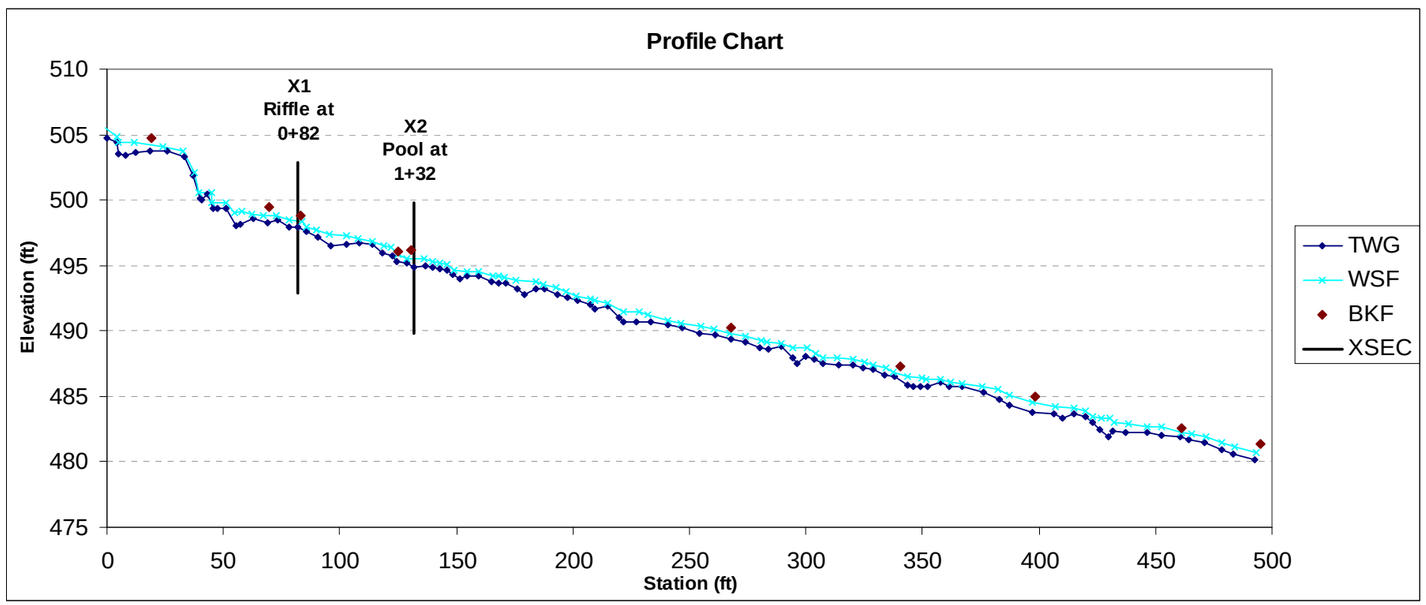
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A4	3.6	4.6	0.8	1.1	5.9	1.0	3.0	502.1	502.1



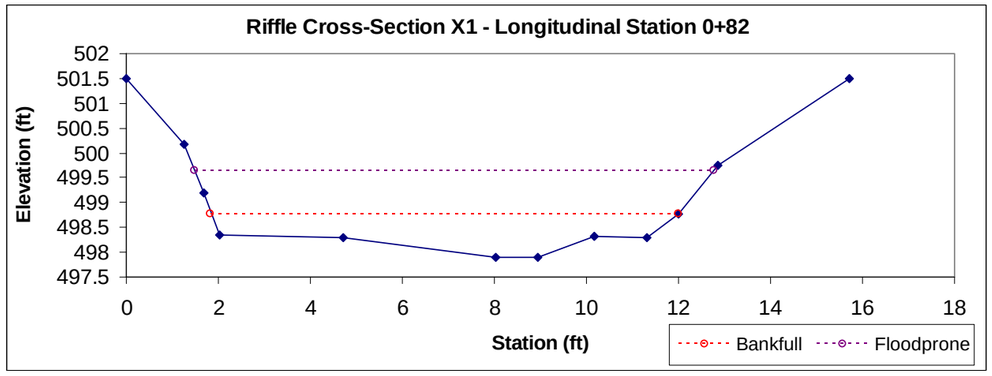
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A4	5.8	7.2	0.8	1.5	9.1	2.4	1.6	477.6	479.8



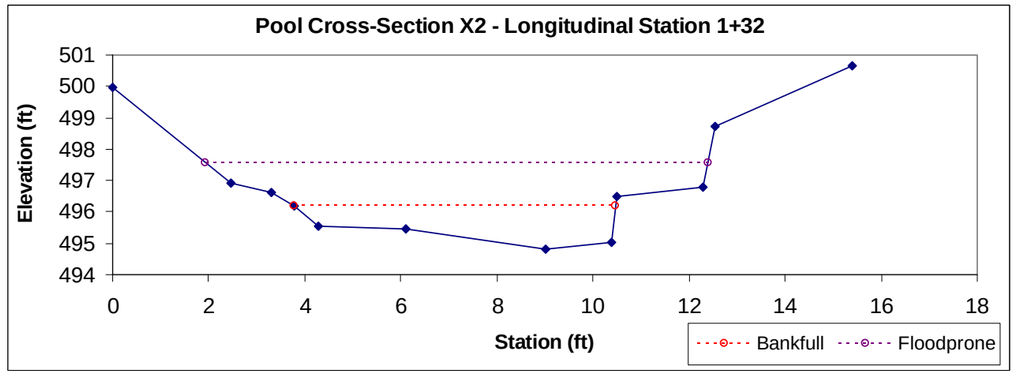
Unnamed Tributary 1 of Unnamed Tributary 17 of
Ruth Trace Branch
Permanent Ephemeral
(UT1UT17RTBPE)
Profile and Cross-section Data



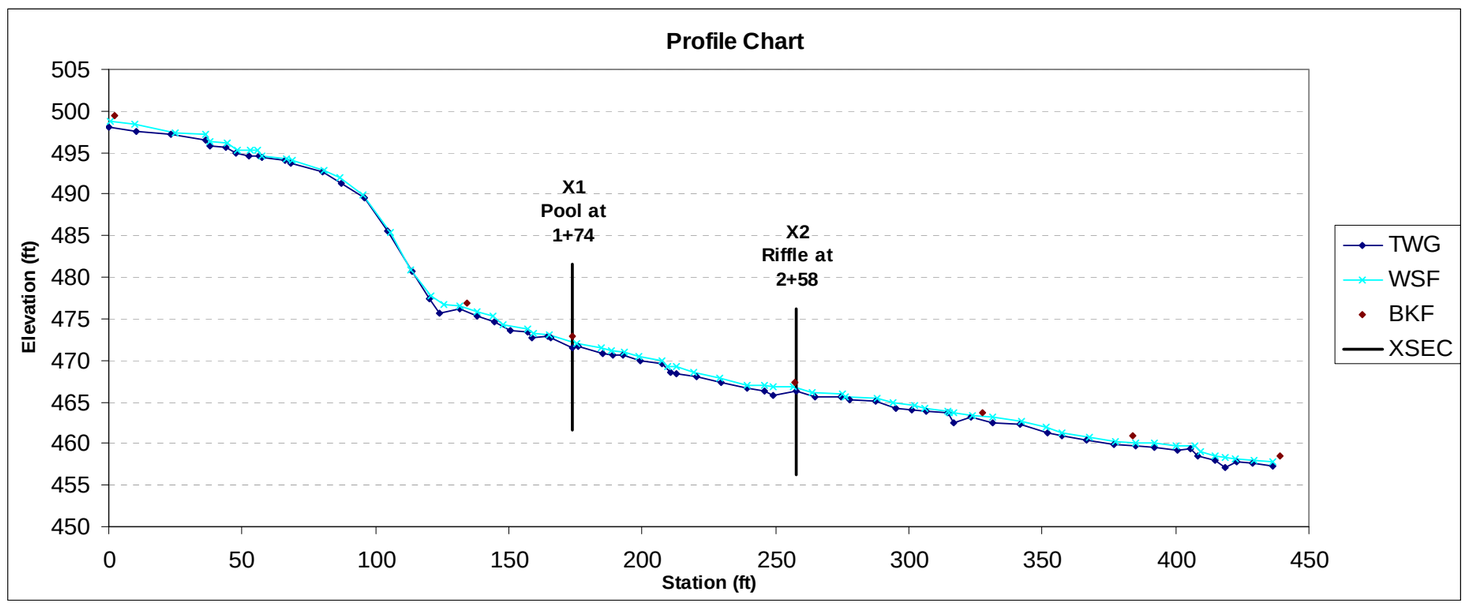
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	B4a	5.7	10.2	0.6	0.9	18.2	4.1	1.1	498.8	501.5



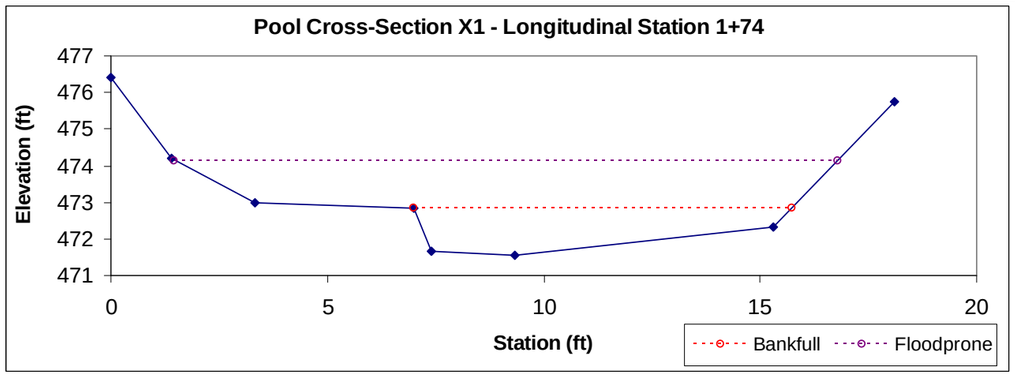
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	B4a	6.2	6.7	0.9	1.4	7.2	2.9	1.6	496.2	498.7



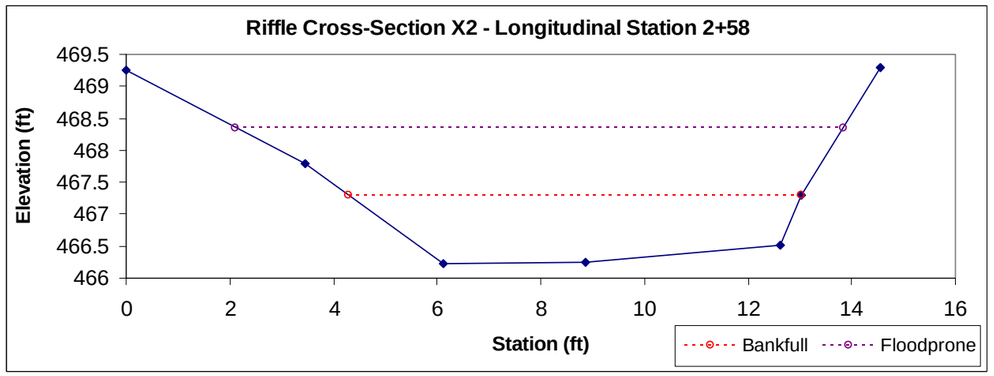
Right Fork of Conley Branch
Temporary Perennial
(RFCBTP)
Profile and Cross-section Data



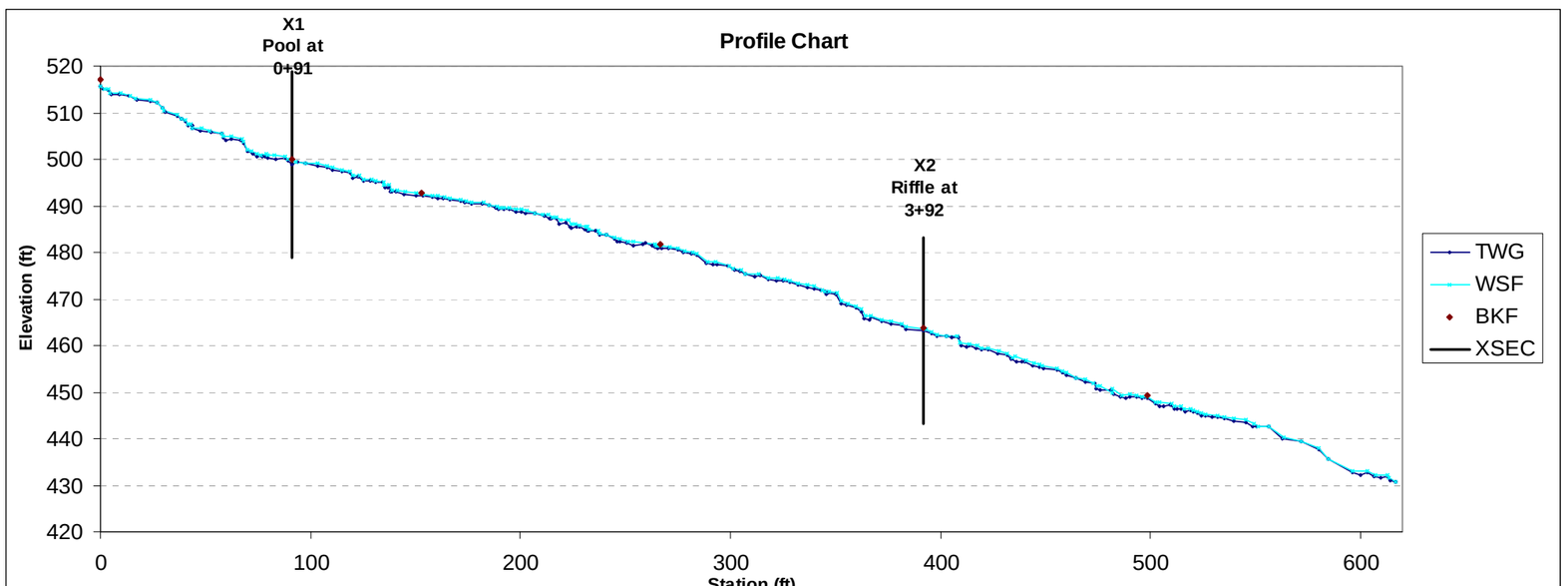
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A4/1	8.2	8.8	0.9	1.2	9.4	2.0	1.8	472.9	474.2



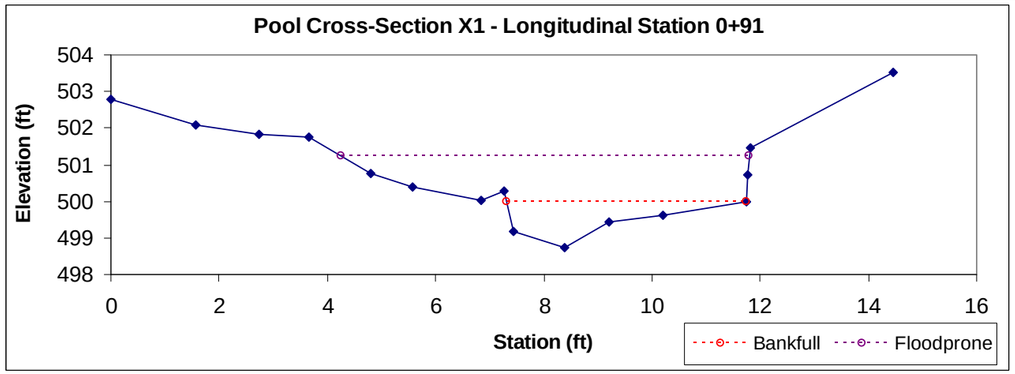
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A4/1	7.5	8.7	0.9	1.1	10.2	1.5	1.3	467.2	467.8



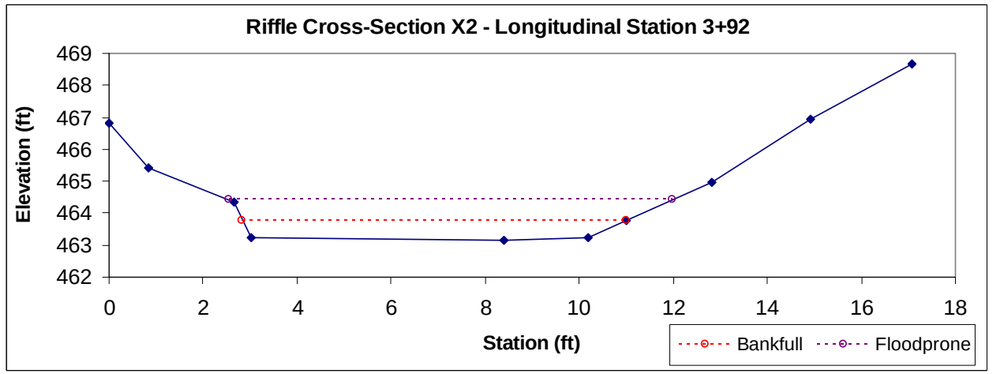
Right Fork of Conley Branch
Permanent Perennial
(RFCBPP)
Profile and Cross-section Data



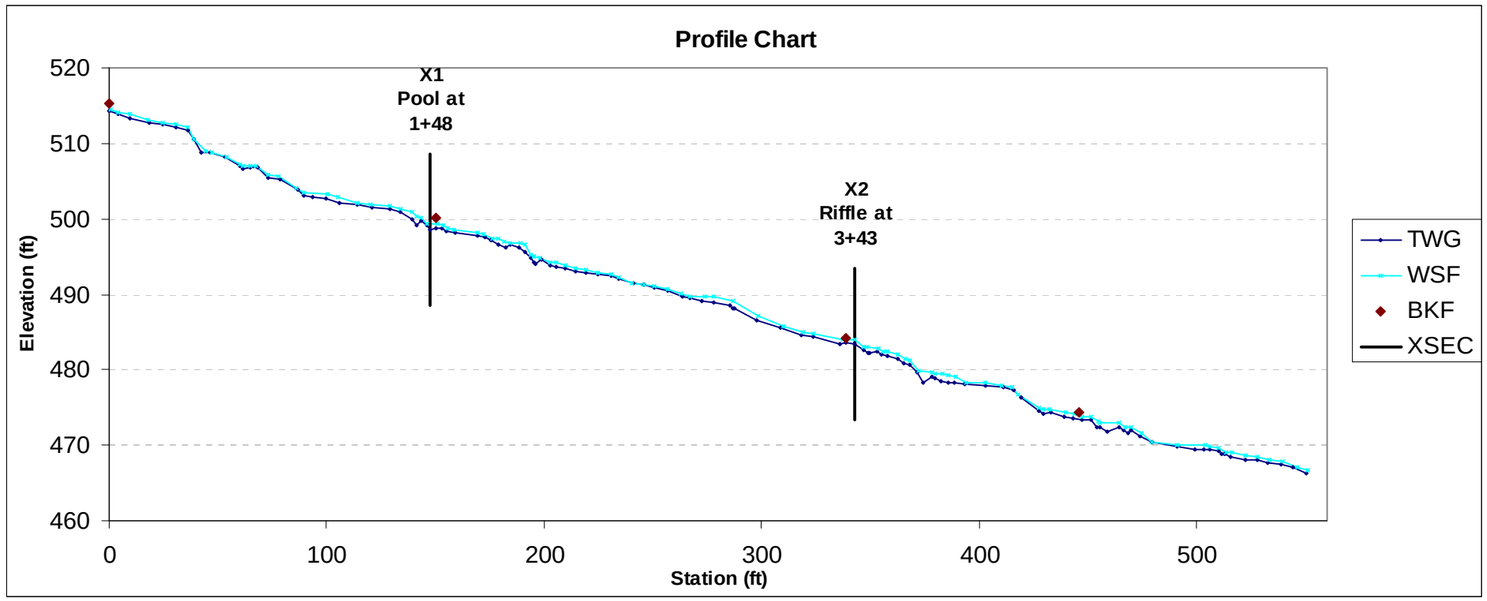
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A4	2.5	4.4	0.6	1.2	7.8	2.4	1.7	500.0	501.7



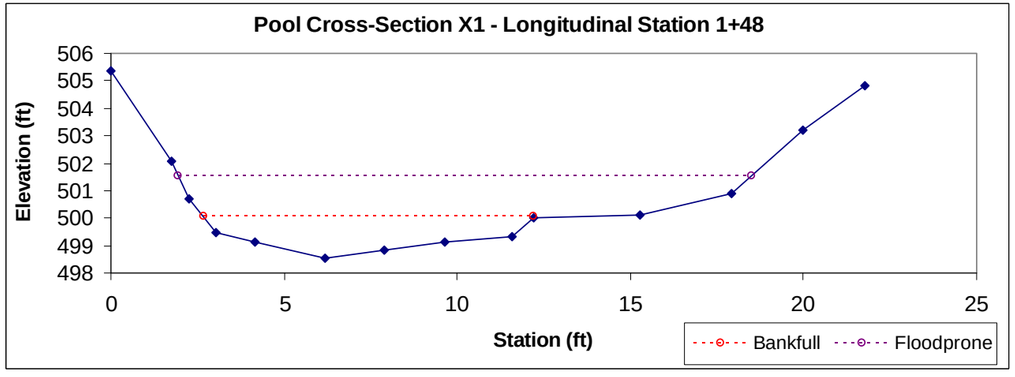
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A4	4.5	8.2	0.6	0.6	14.8	5.7	1.2	463.8	466.8



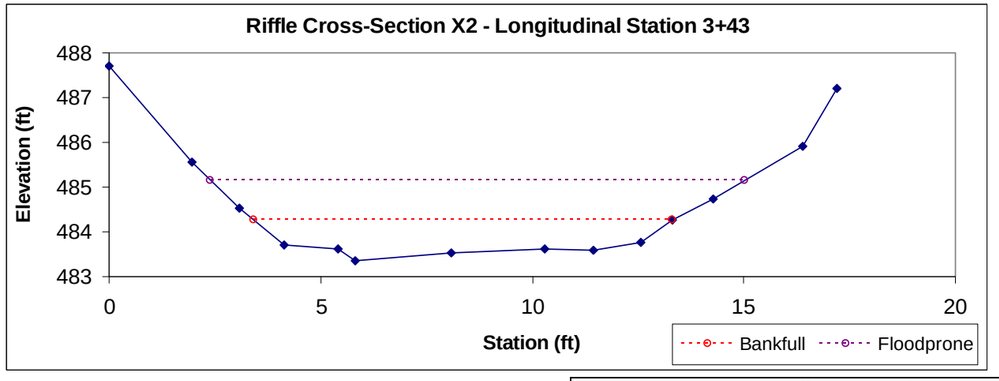
Right Fork of Conley Branch
Permanent Intermittent
(RFCBPI)
Profile and Cross-section Data



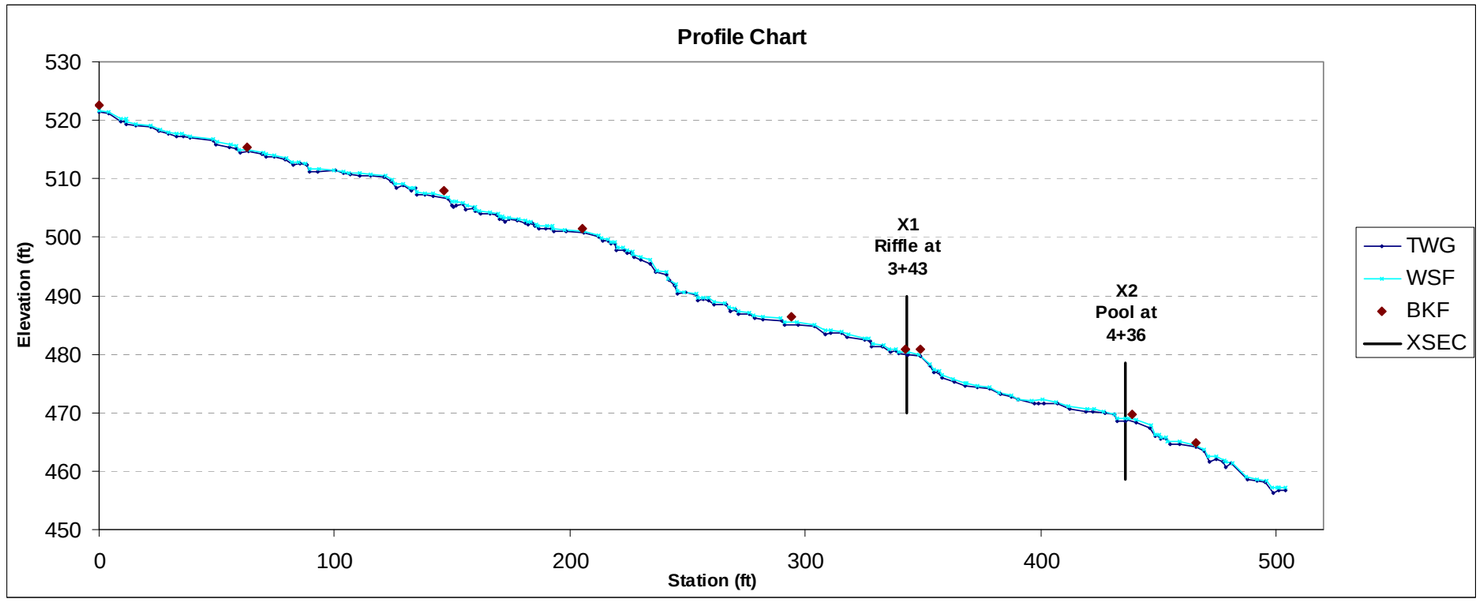
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A4	9.3	9.5	1.0	1.5	9.7	4.2	1.7	500.0	504.8



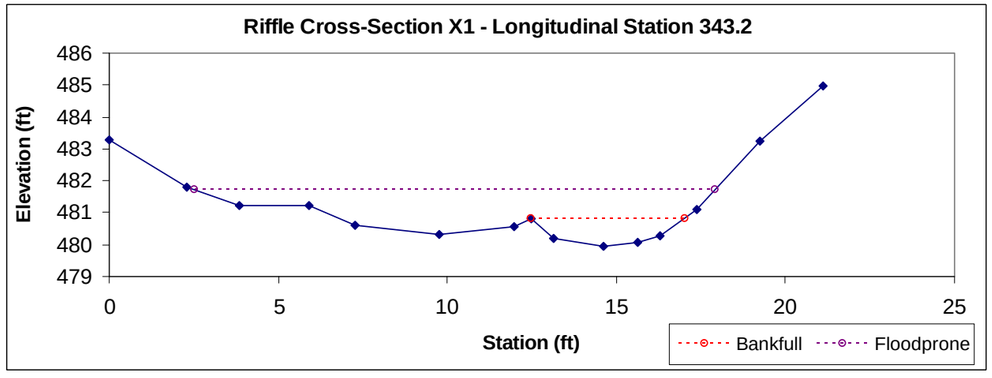
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A4	6.3	9.9	0.6	0.9	15.6	4.3	1.3	484.3	487.2



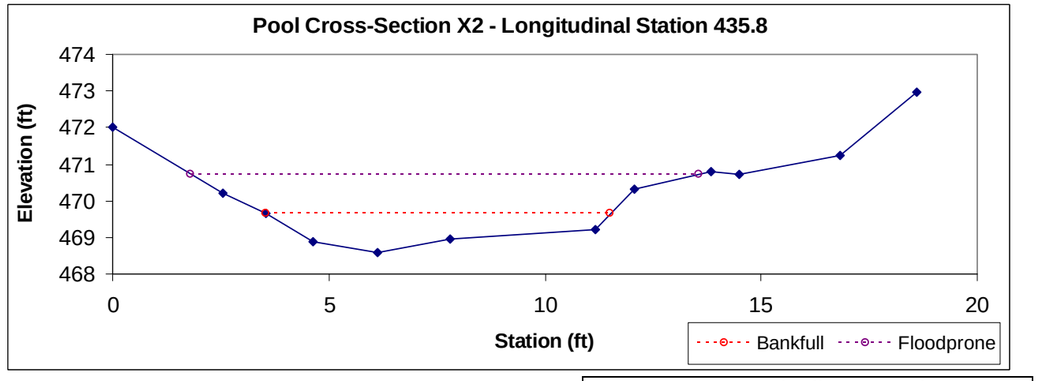
Unnamed Tributary 1 of
Right Fork of Conley Branch
Temporary Perennial
(UT1RFCBTP)
Profile and Cross-section Data



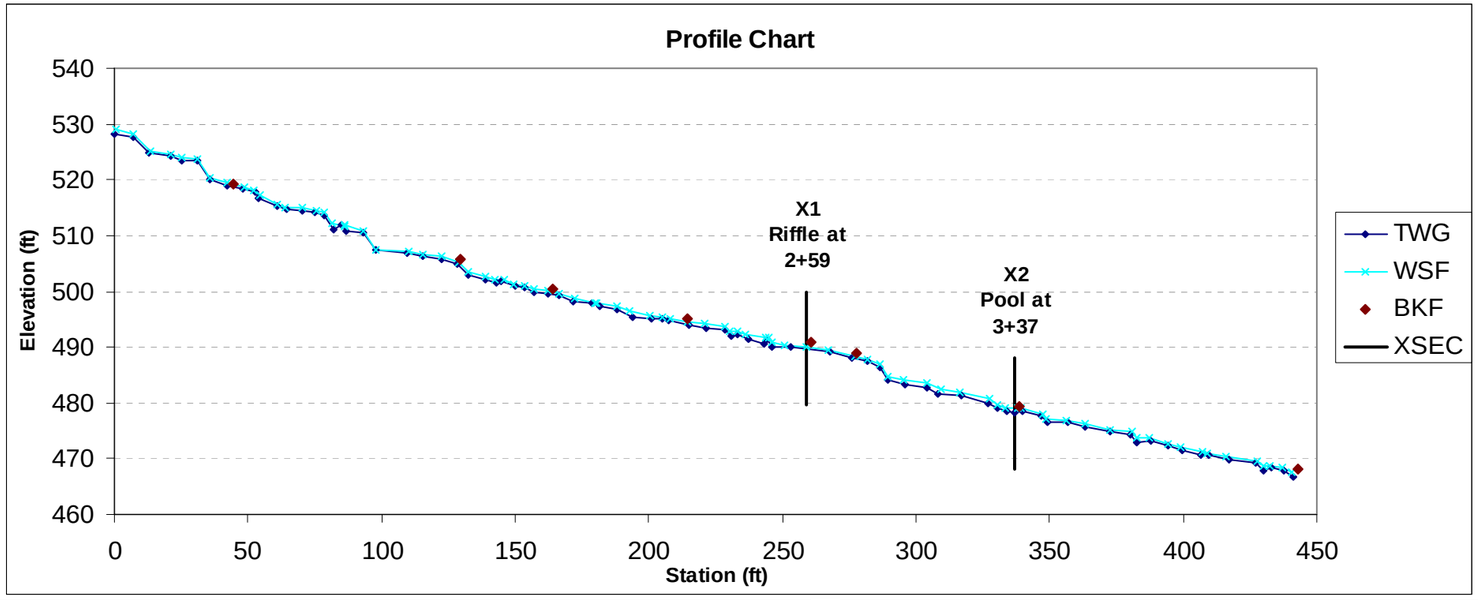
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A4a+	2.8	4.6	0.6	0.9	7.5	3.8	3.4	480.8	483.3



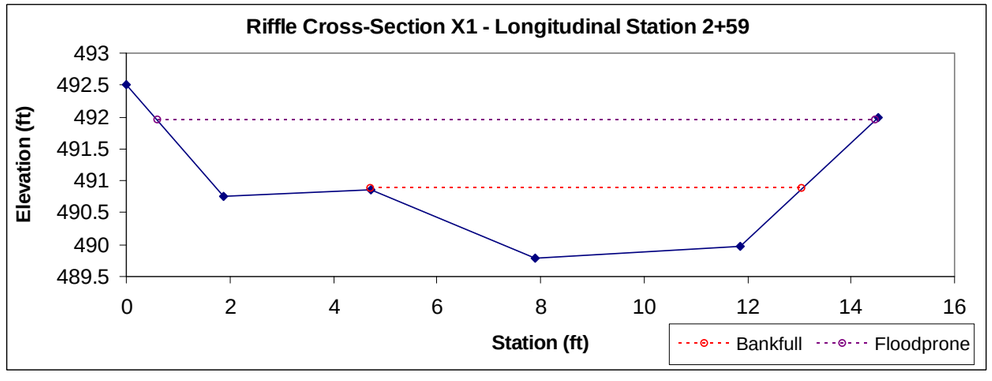
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A4a+	5.2	8.0	0.7	1.1	12.1	3.2	1.5	469.7	472.0



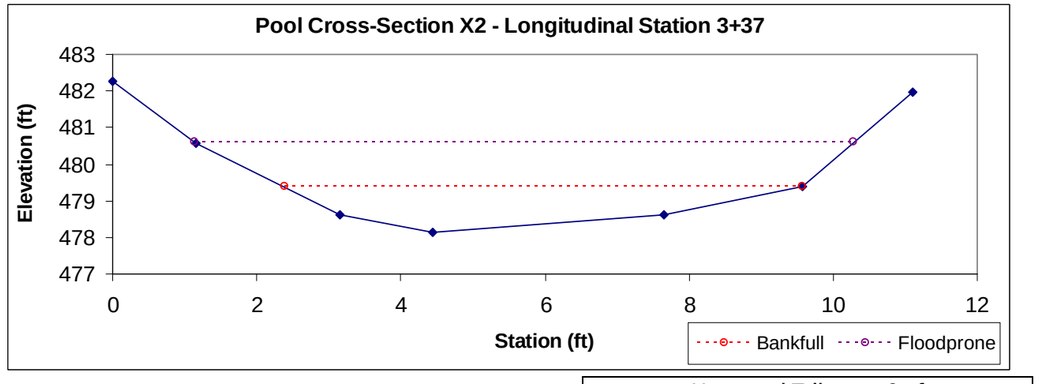
Unnamed Tributary 1 of
Right Fork of Conley Branch
Permanent Intermittent
(UT1RFCBPI)
Profile and Cross-section Data



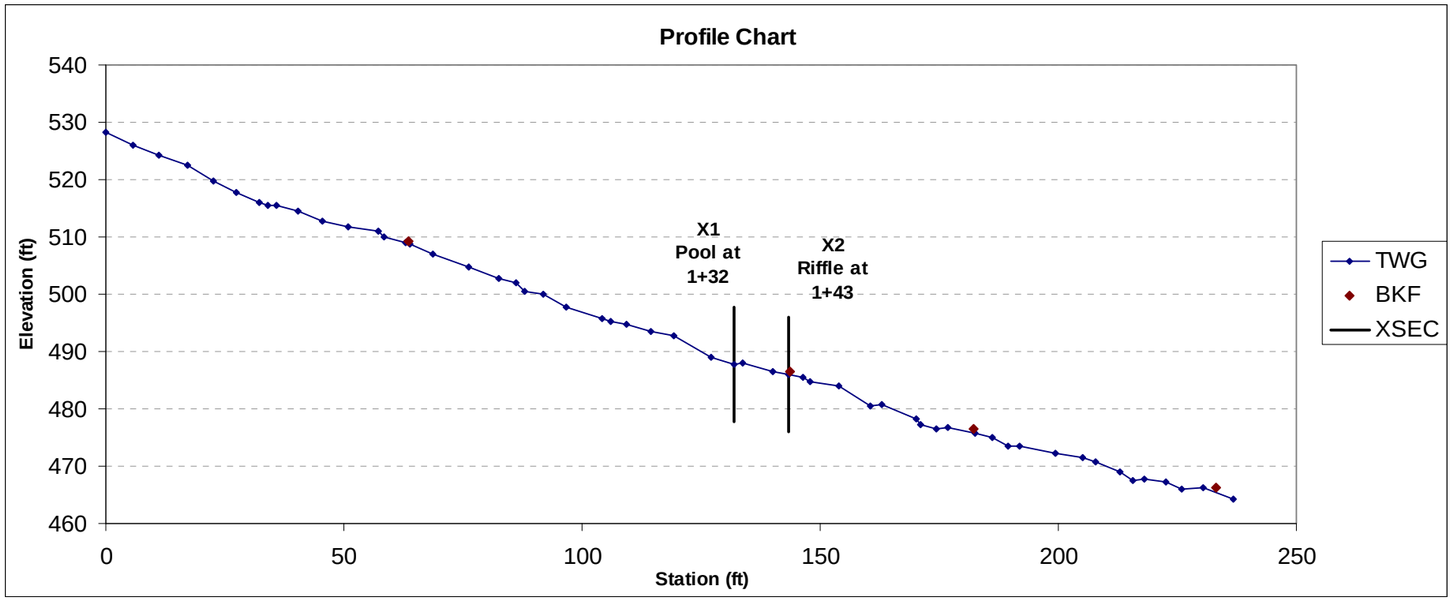
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A4a+	6.2	8.3	0.7	1.1	11.1	2.0	1.7	490.9	492.0



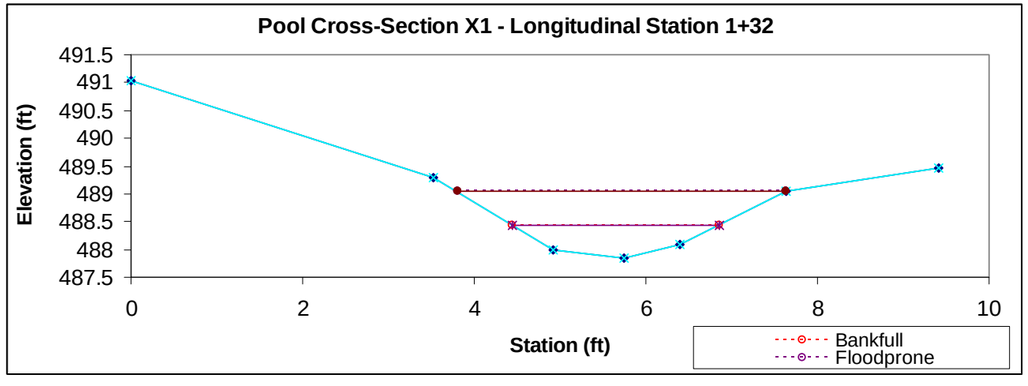
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A4a+	5.5	7.2	0.8	1.2	9.4	2.0	1.3	479.4	480.6



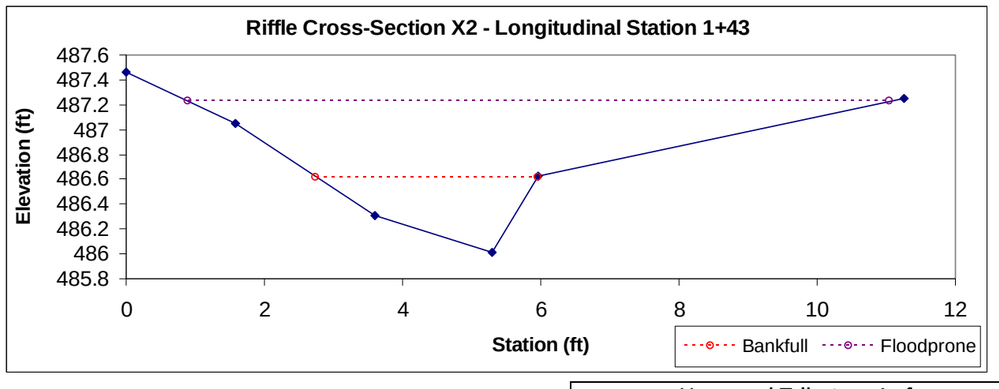
Unnamed Tributary 2 of
Right Fork of Conley Branch
Temporary Intermittent
(UT2RFCBTI)
Profile and Cross-section Data



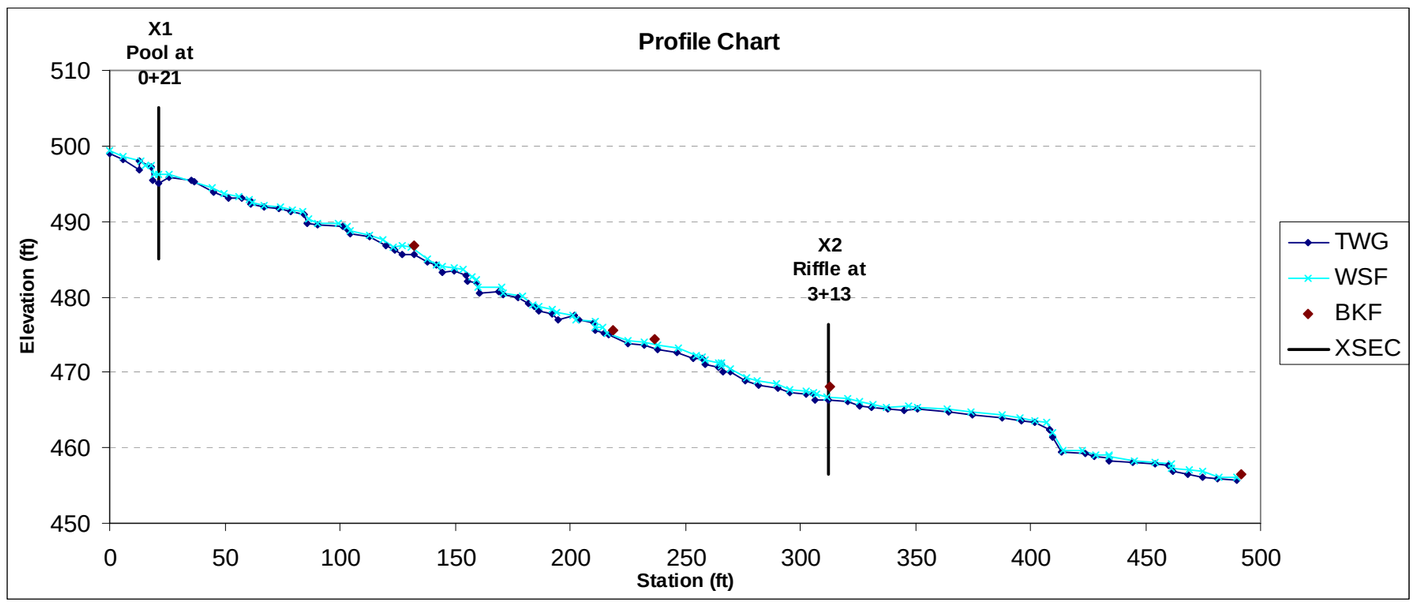
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A4a+	0.9	2.4	0.4	0.6	6.2	2.0	1.6	488.4	489.0



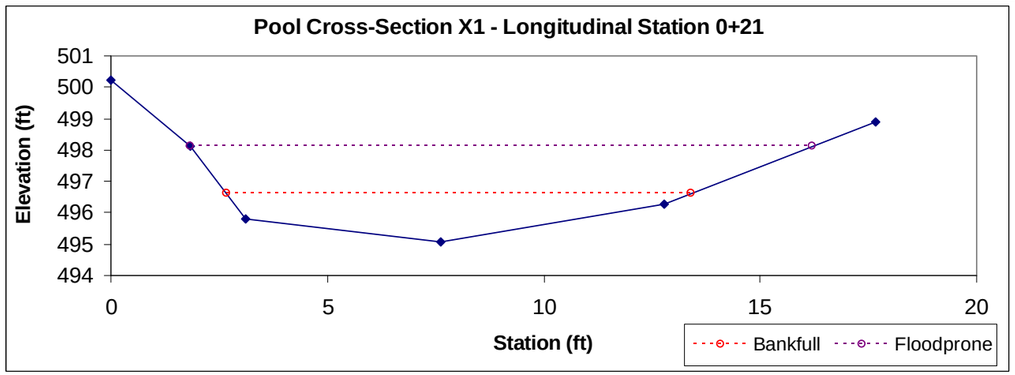
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A4a+	1.1	3.2	0.4	0.6	9.3	1.7	3.2	486.6	487.1



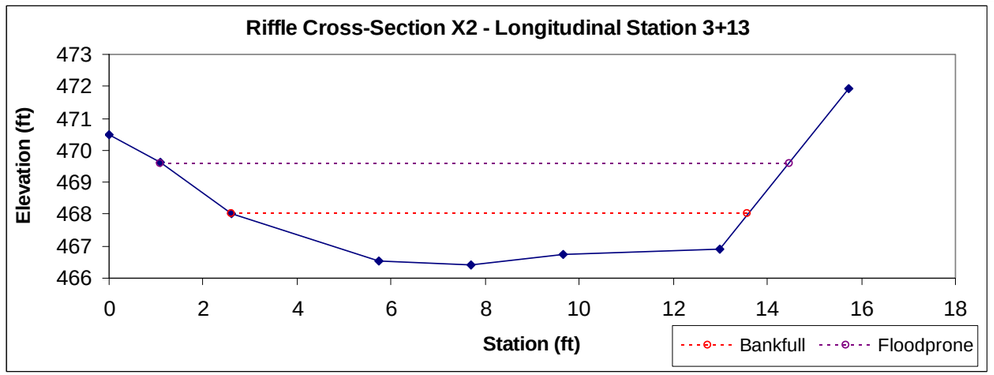
Unnamed Tributary 4 of
Right Fork of Conley Branch
Permanent Ephemeral
(UT4RFCBPE)
Profile and Cross-section Data



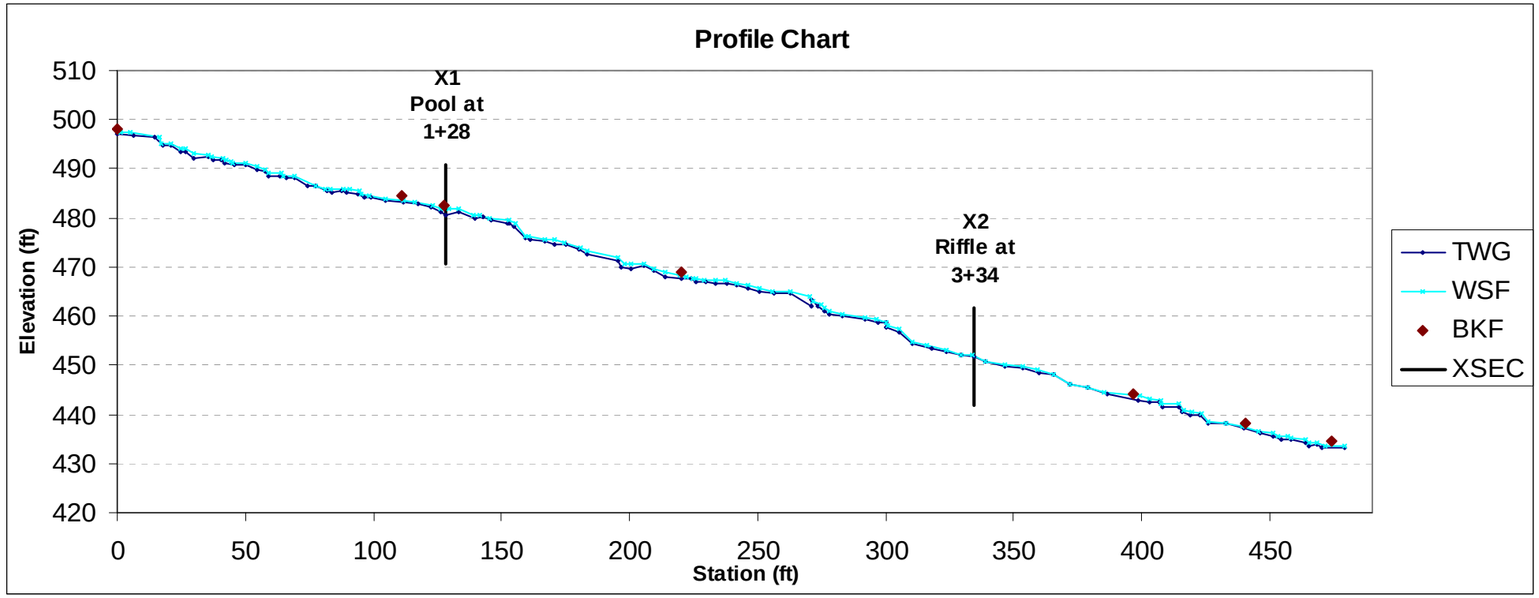
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A4/1	10.3	10.7	1.0	1.5	11.2	2.0	1.3	496.6	498.1



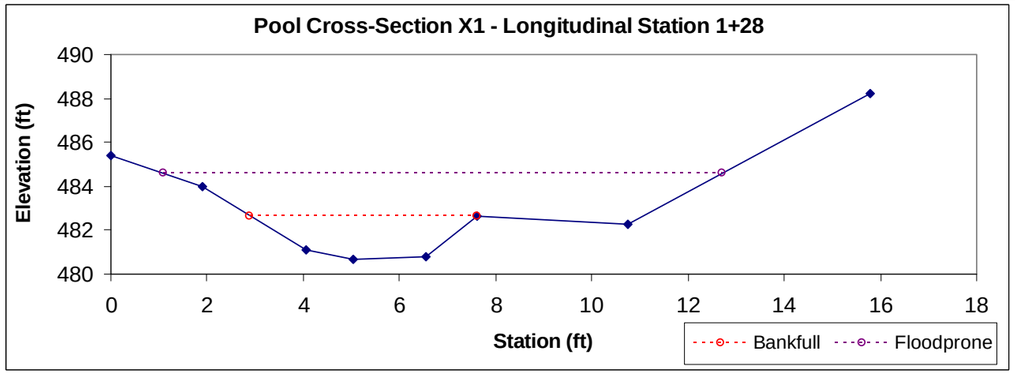
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A4/1	12.4	11.0	1.1	1.6	9.8	2.0	1.2	468.0	469.6



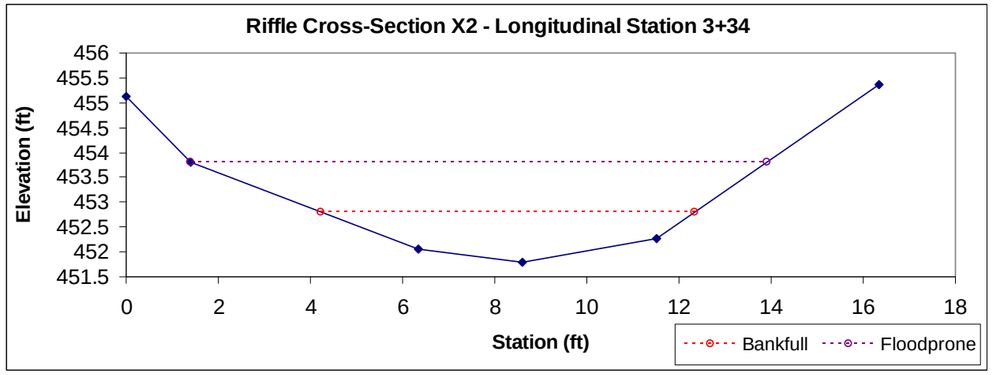
Left Fork of Conley Branch
Temporary Intermittent
(LFCBTI)
Profile and Cross-section Data



Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A4/1a+	6.5	4.7	1.4	2.0	3.4	1.7	2.5	482.7	484.0

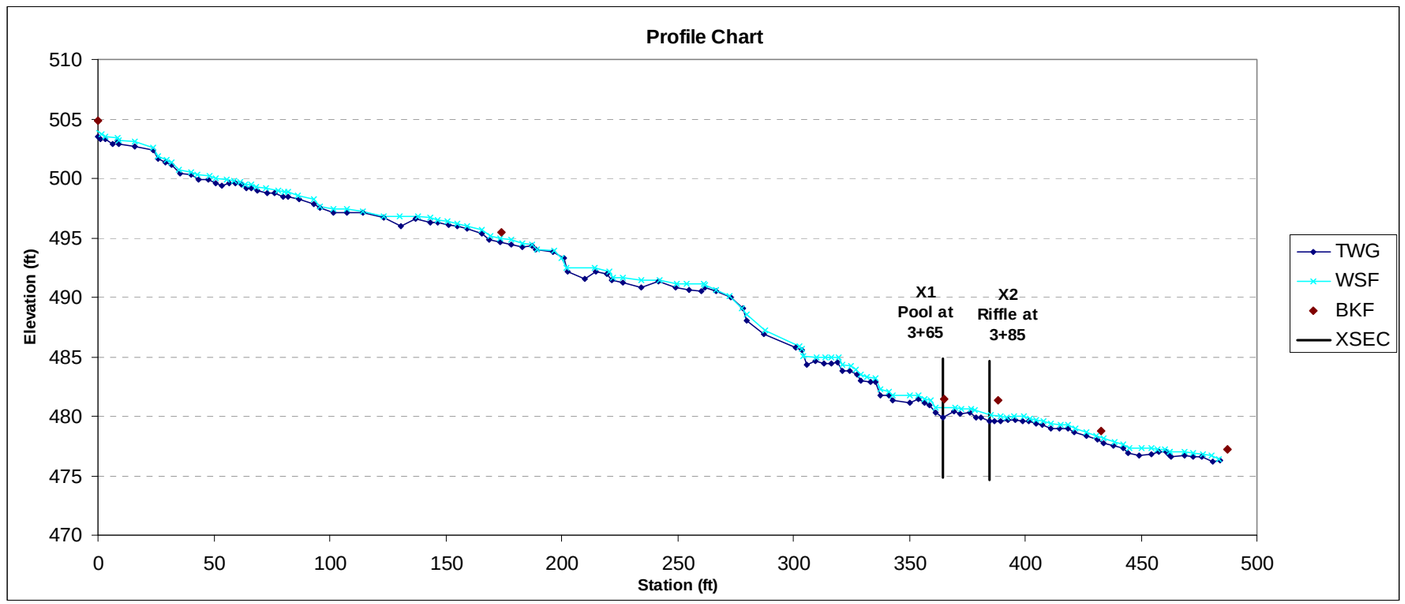


Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A4/1a+	5.2	8.1	0.6	1.0	12.6	2.0	1.5	452.8	453.8

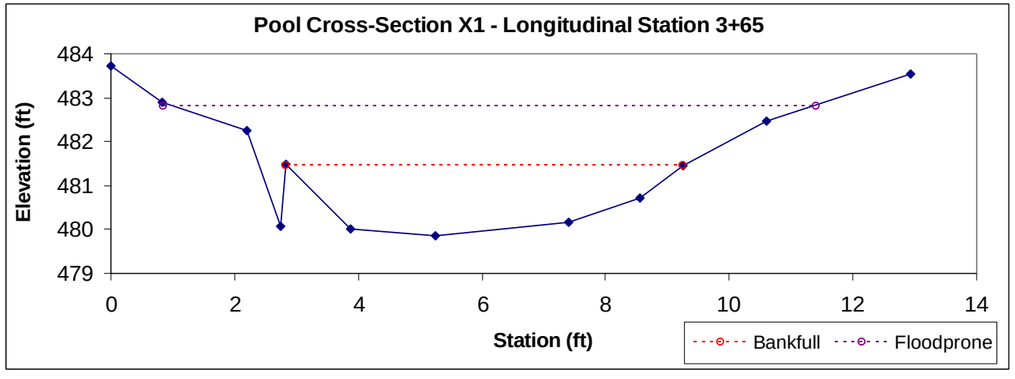


Left Fork of Conley Branch
Permanent Intermittent
(LFCBPI)

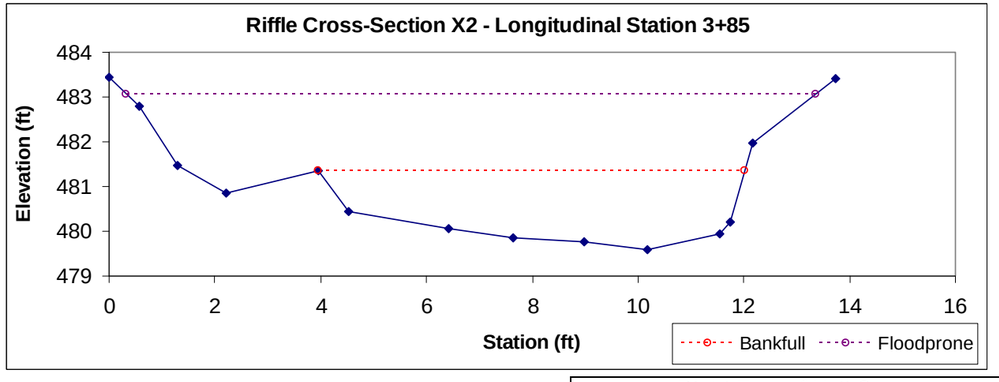
Profile and Cross-section Data



Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	B4a	7.3	6.4	1.1	1.6	5.6	1.7	1.7	481.5	482.5

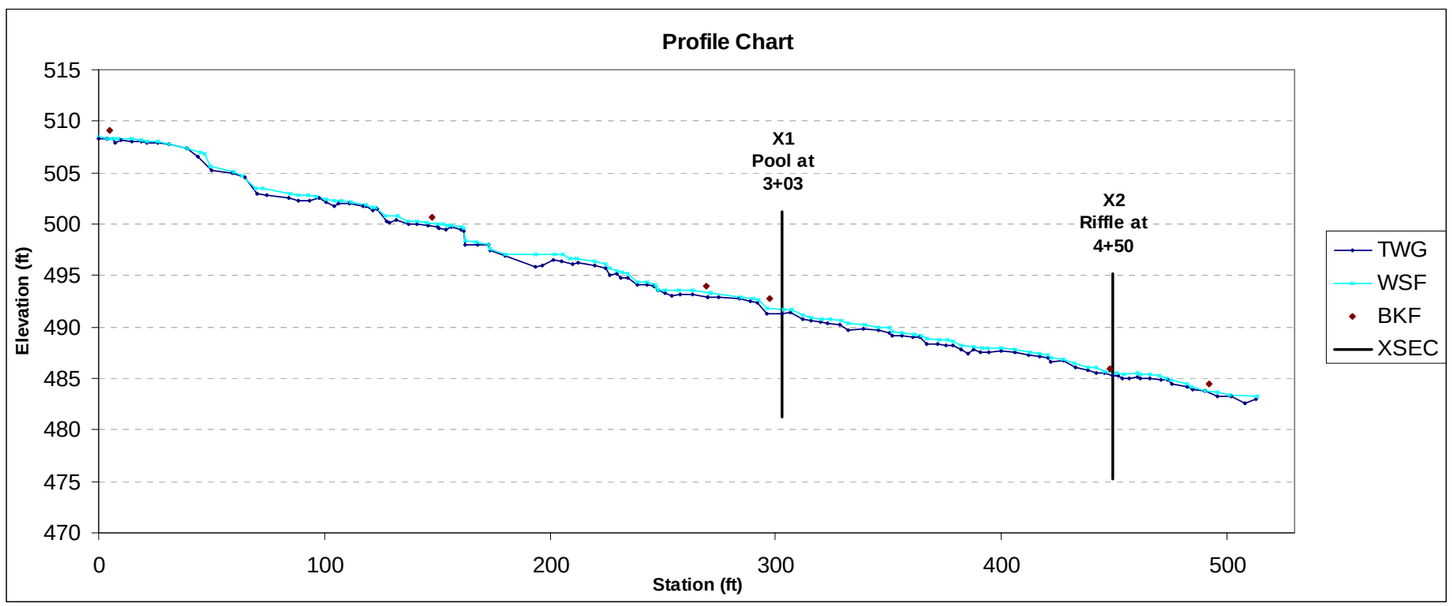


Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	B4a	10.6	8.1	1.3	1.7	6.1	1.4	1.6	481.3	482.0

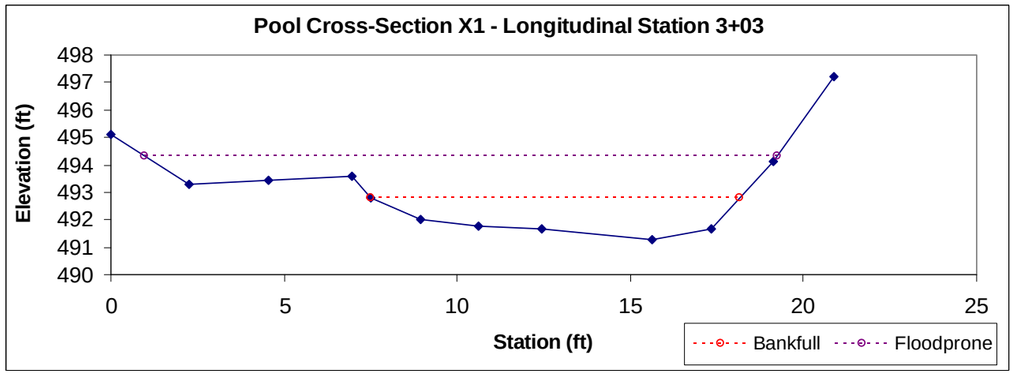


Right Fork of Hell Creek
Temporary Perennial 1
(RFHCTP1)

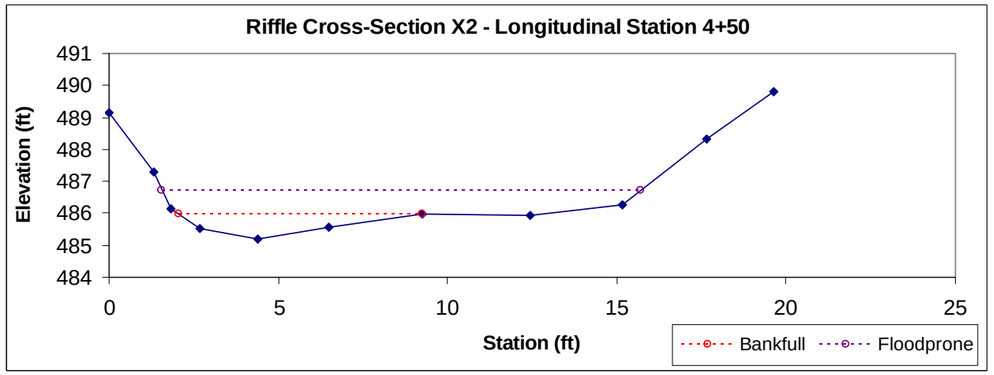
Profile and Cross-section Data



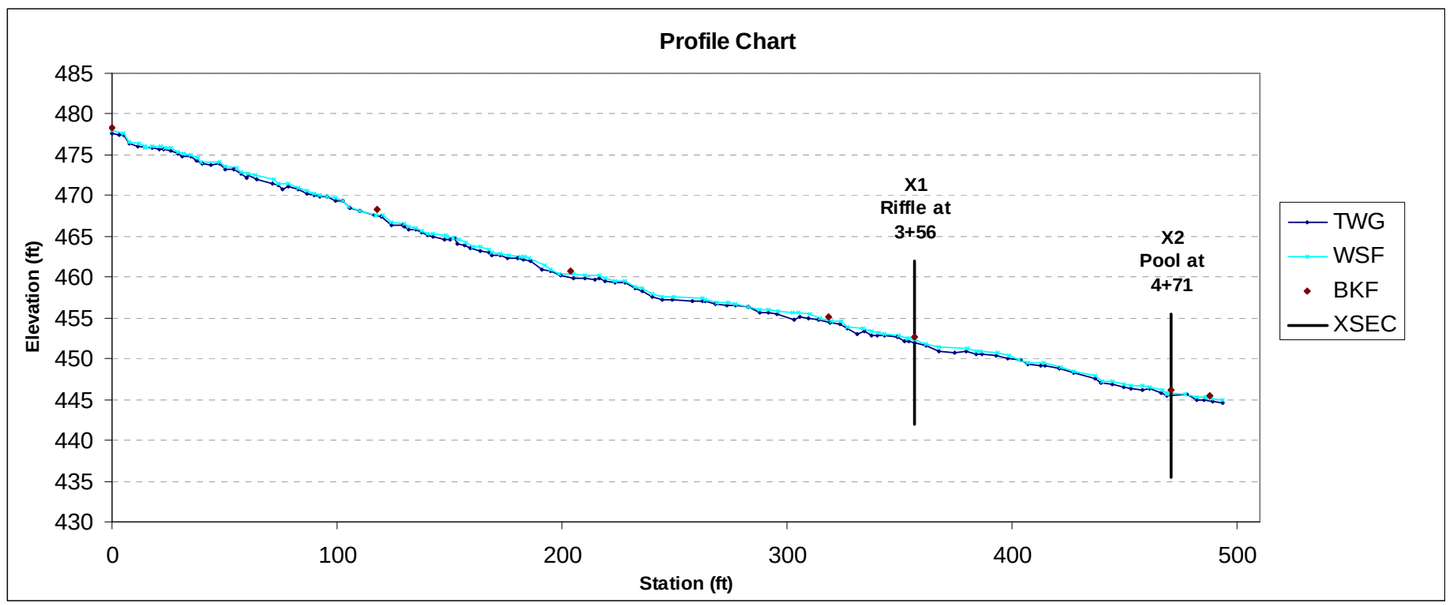
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	B4/1a	11.1	10.7	1.0	1.5	10.3	1.5	1.7	492.8	493.6



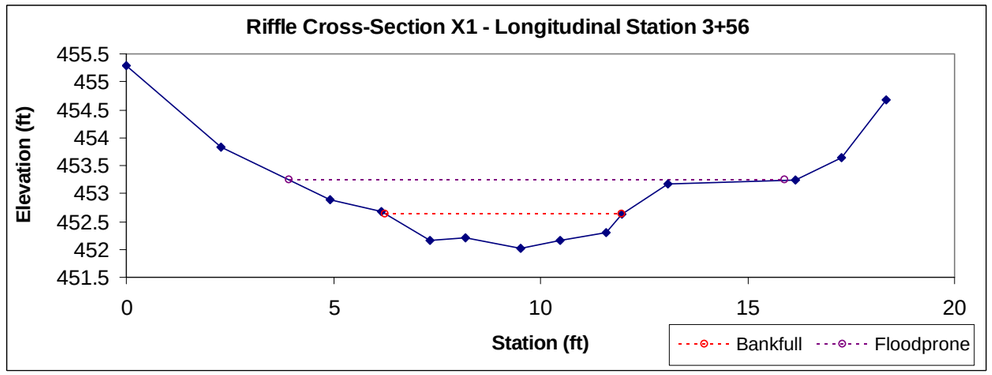
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	B4/1a	2.9	7.2	0.4	0.8	17.6	5.2	2.0	486.0	489.1



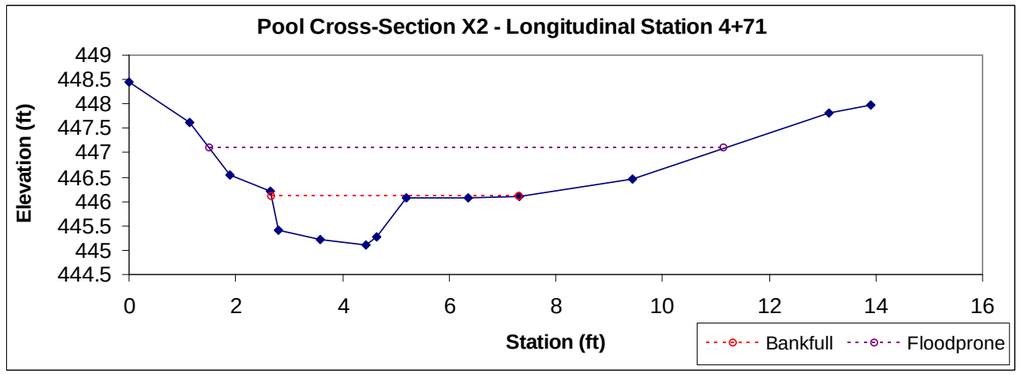
Right Fork of Hell Creek
Temporary Perennial 2
(RFHCTP2)
Profile and Cross-section Data



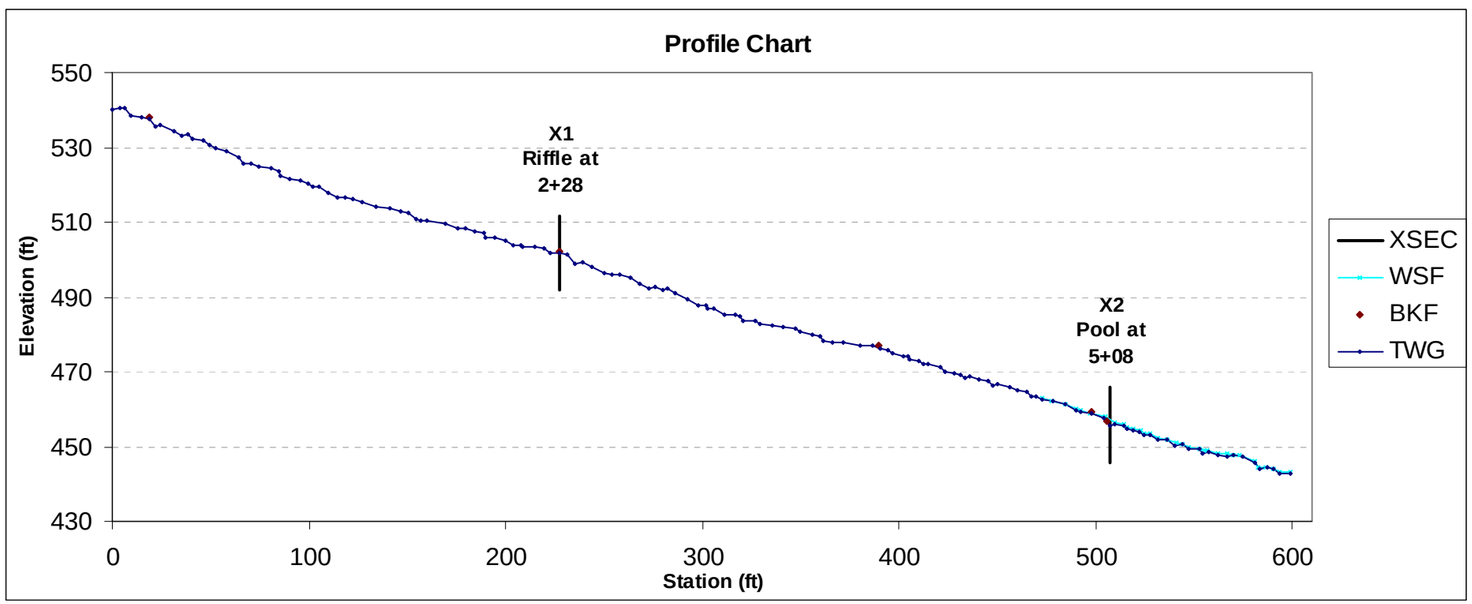
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	B4a	2.3	5.7	0.4	0.6	14.0	4.3	2.1	452.6	454.7



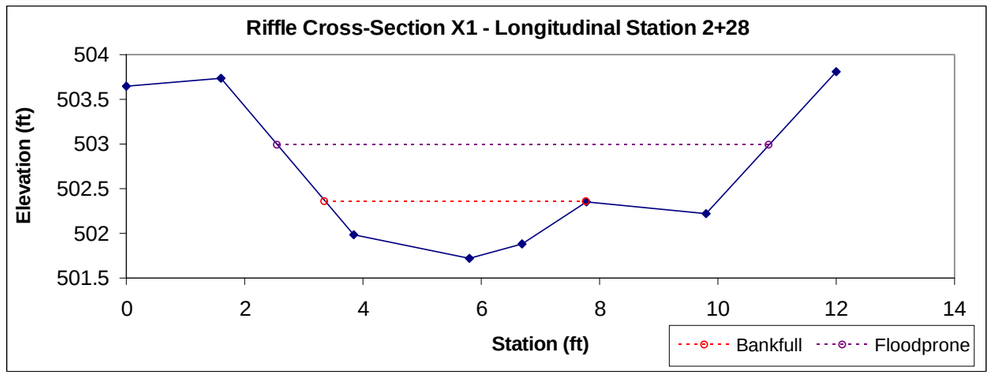
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	B4a	1.9	4.7	0.4	1.0	11.3	2.9	2.1	446.1	448.0



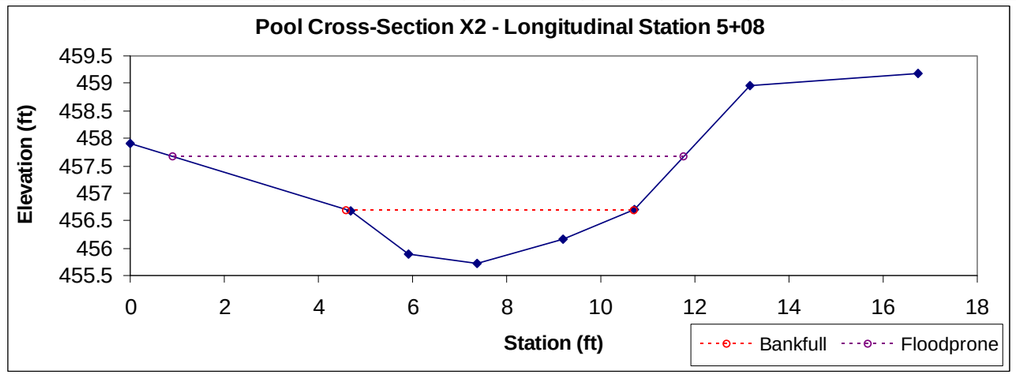
Right Fork of Hell Creek
Permanent Intermittent
(RFHCPI)
Profile and Cross-section Data



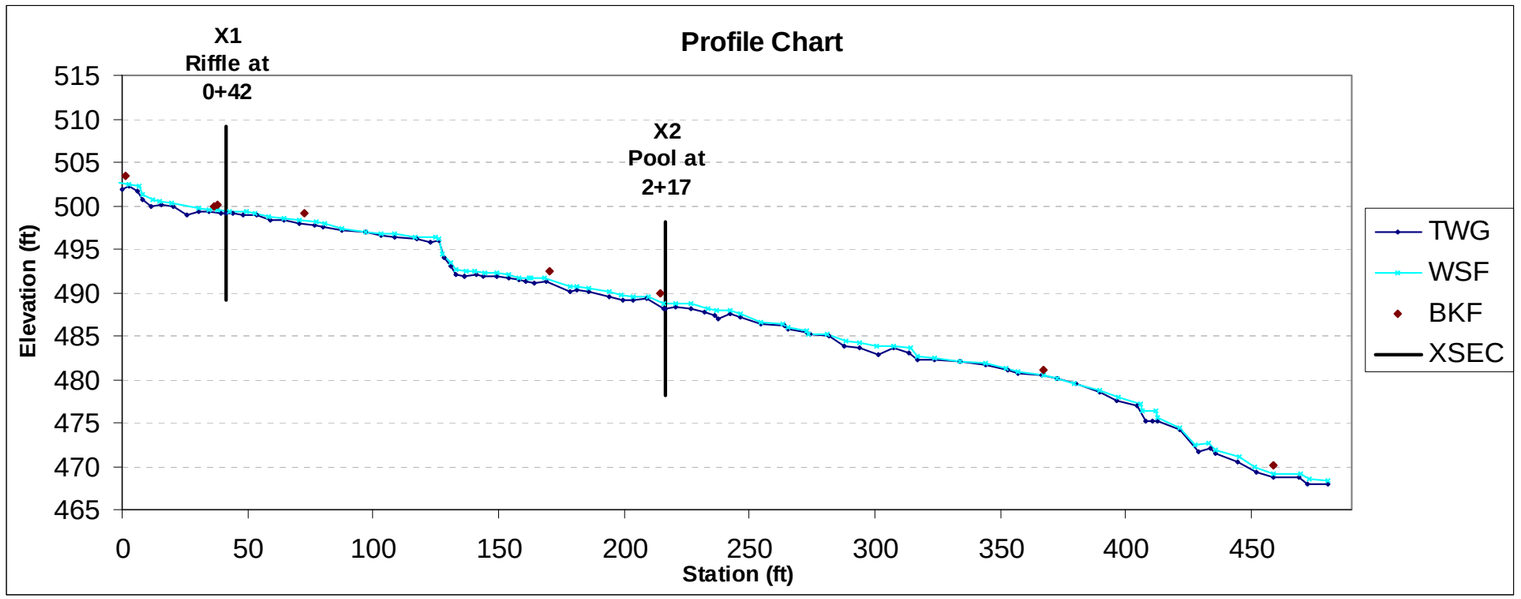
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A4	1.8	4.4	0.4	0.6	10.7	3.2	1.9	502.4	503.7



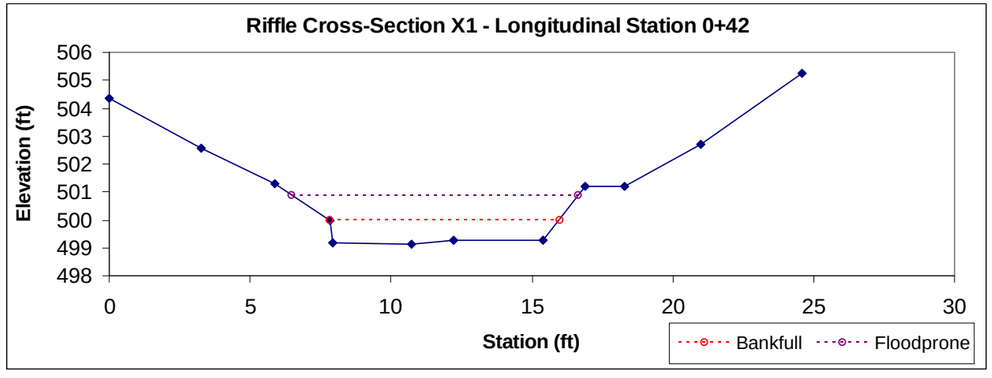
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A4	3.5	6.1	0.6	1.0	10.6	2.2	1.8	456.7	457.9



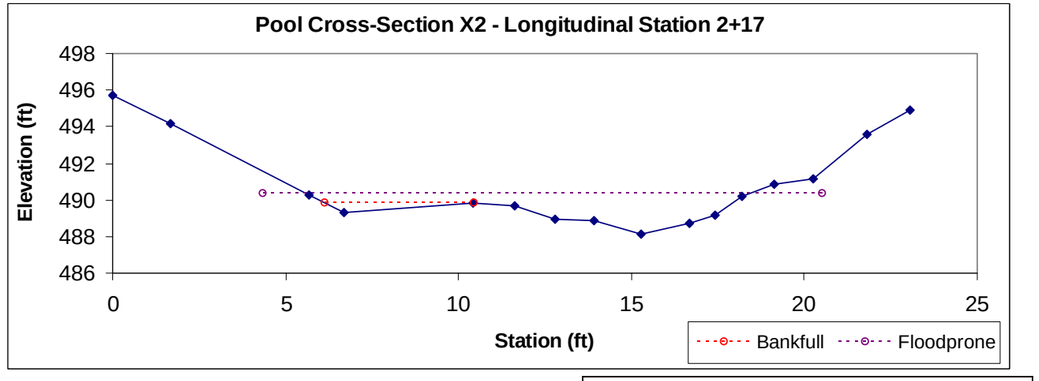
Right Fork of Hell Creek
Permanent Ephemeral
(RFHCPE)
Profile and Cross-section Data



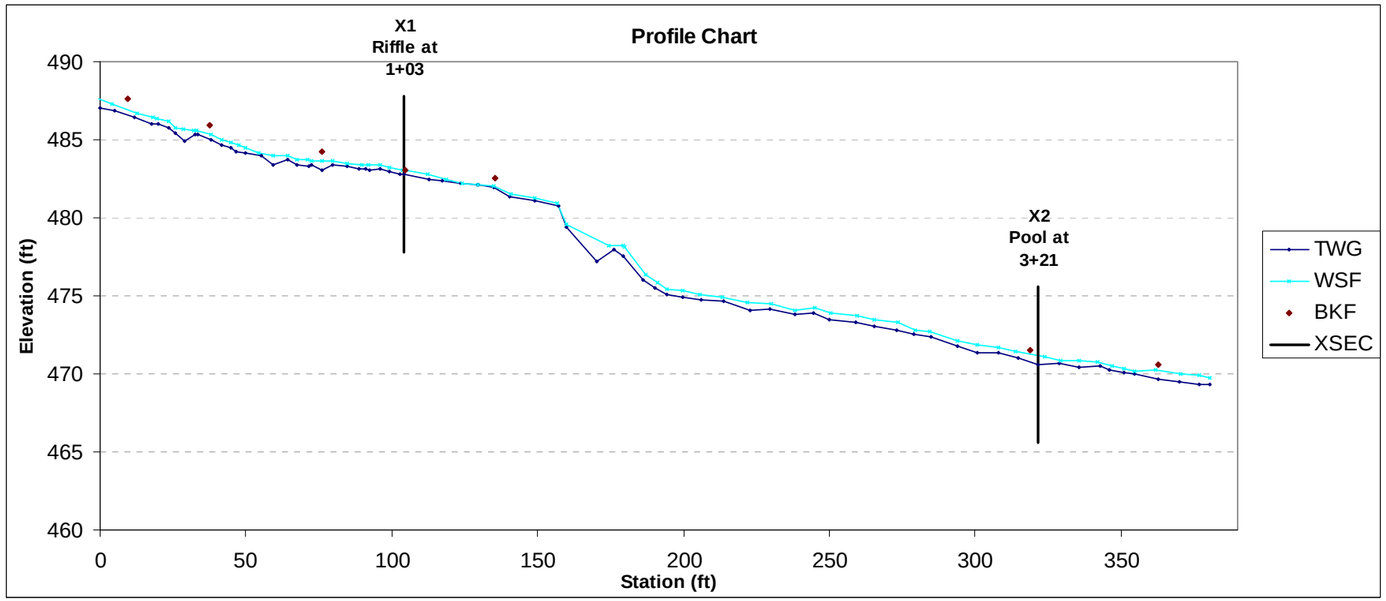
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A1	6.2	8.1	0.8	0.9	10.7	2.4	1.2	500.0	501.2



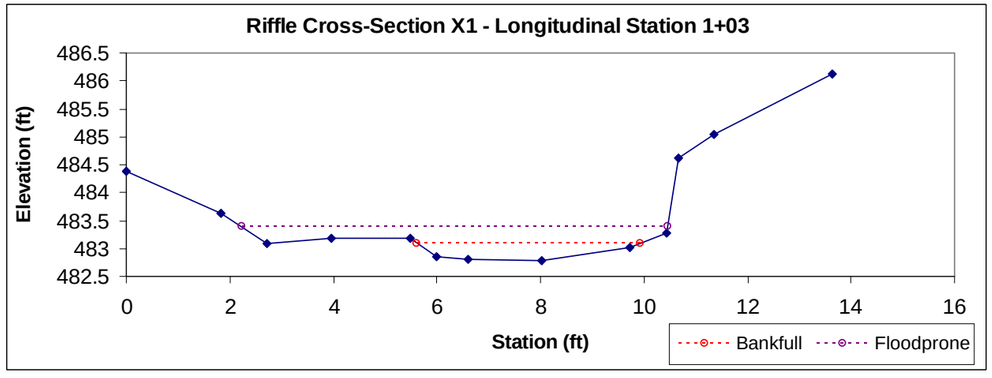
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A1	1.1	4.3	0.3	0.5	16.8	1.0	3.8	489.8	489.8



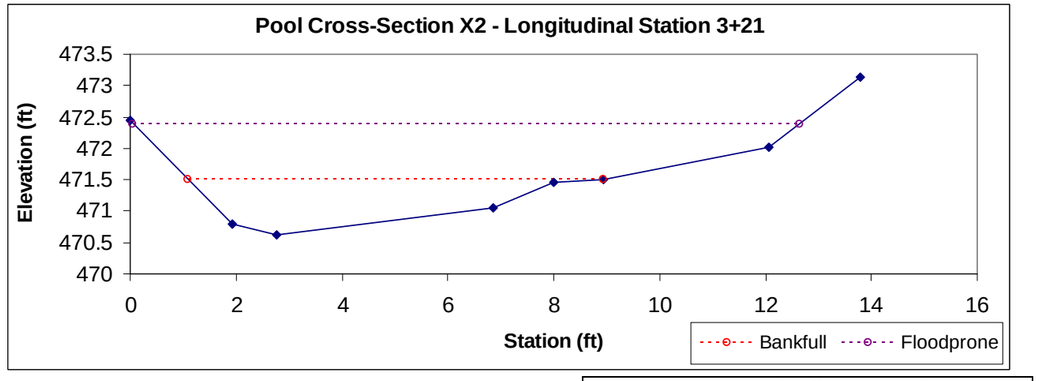
Unnamed Tributary 1 of
Right Fork of Hell Creek
Temporary Perennial
(UT1RFHCTP)
Profile and Cross-section Data



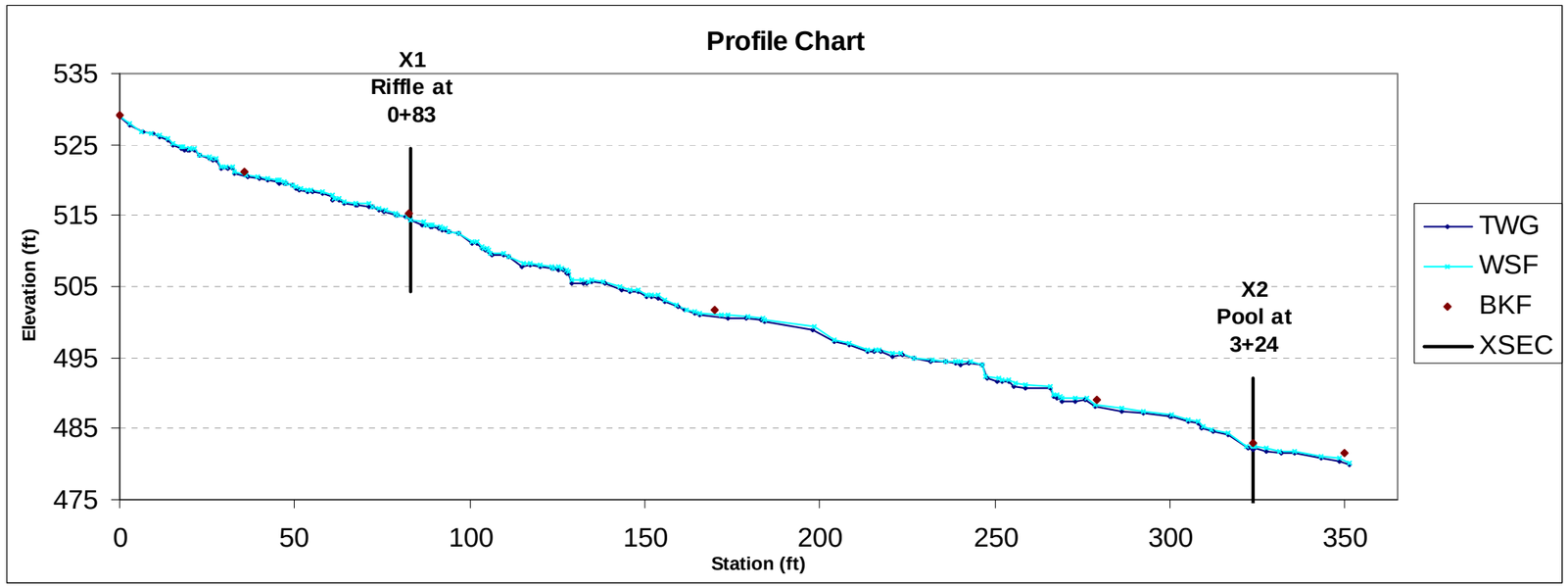
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	B4a	1.0	4.3	0.2	0.3	19.4	5.3	1.9	483.1	484.4



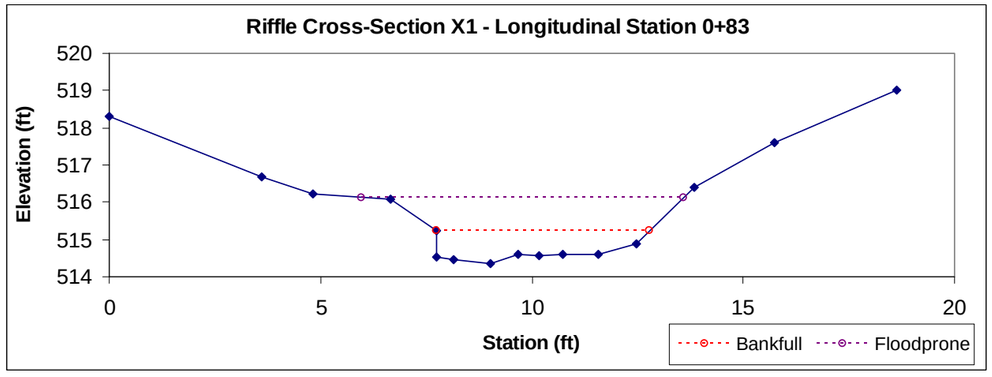
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	B4a	4.0	7.8	0.5	0.9	15.3	2.1	1.6	471.5	472.4



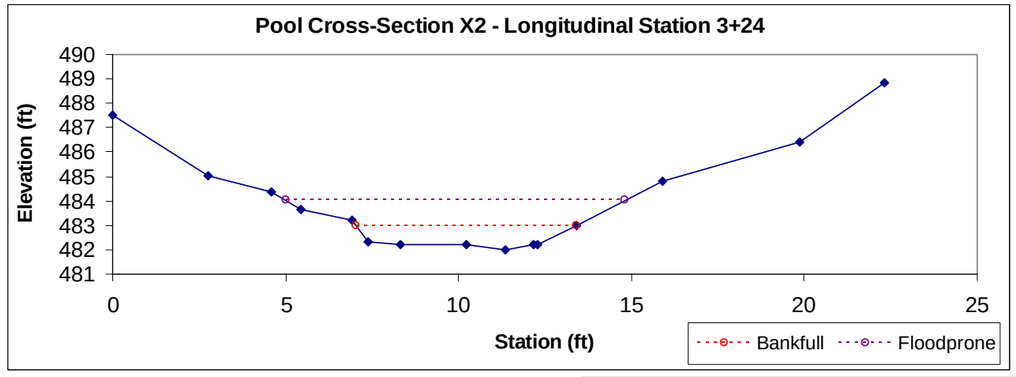
Unnamed Tributary 1 of
Right Fork of Hell Creek
Permanent Perennial
(UT1RFHCPP)
Profile and Cross-section Data



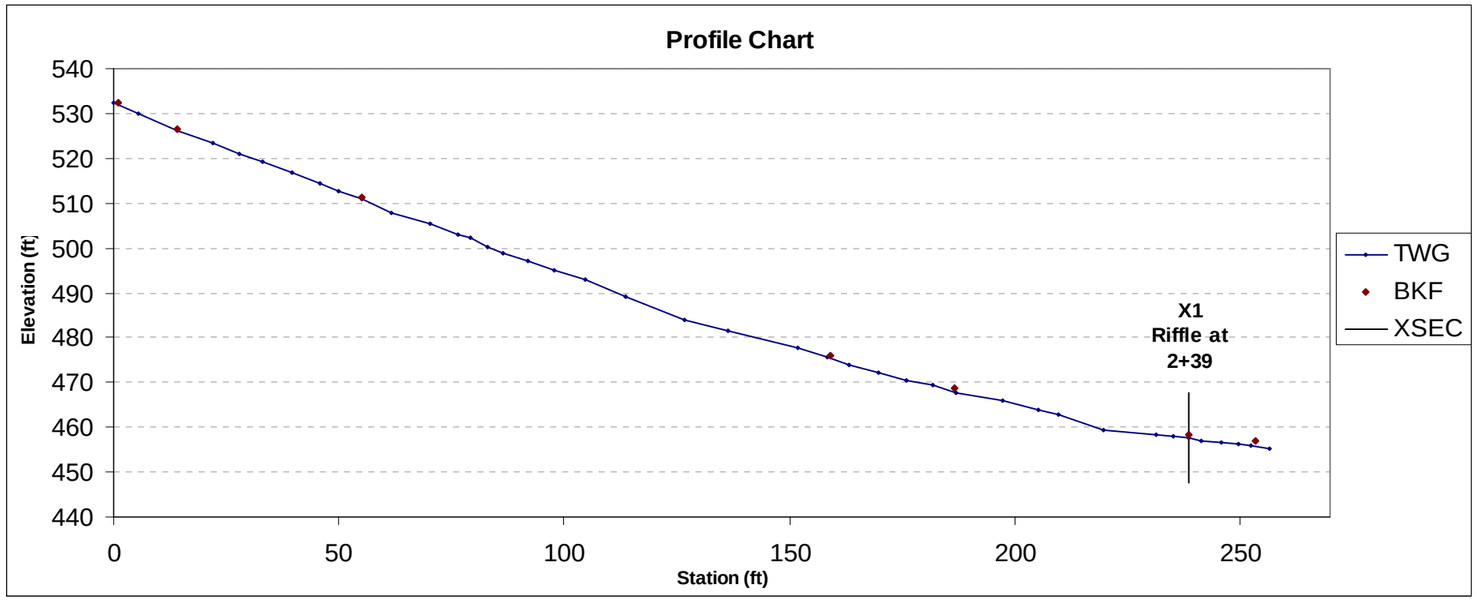
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A3a+	3.3	5.1	0.6	0.9	7.8	1.9	1.5	515.2	516.1



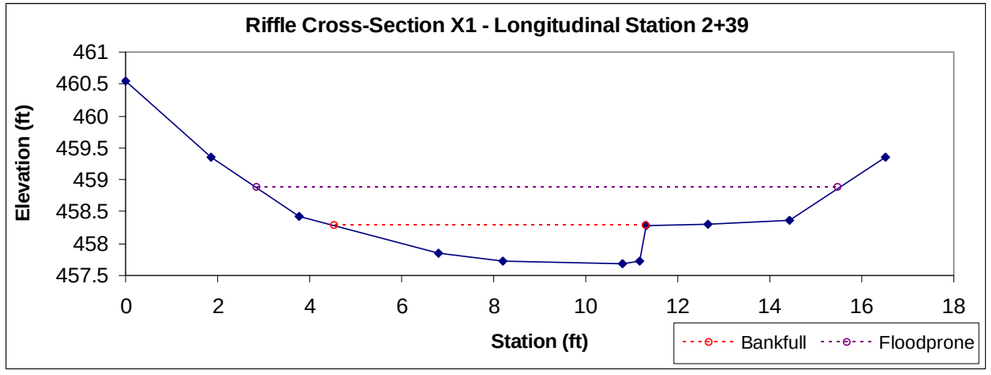
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A3a+	4.5	6.4	0.7	1.0	9.0	2.8	1.5	483.0	484.8



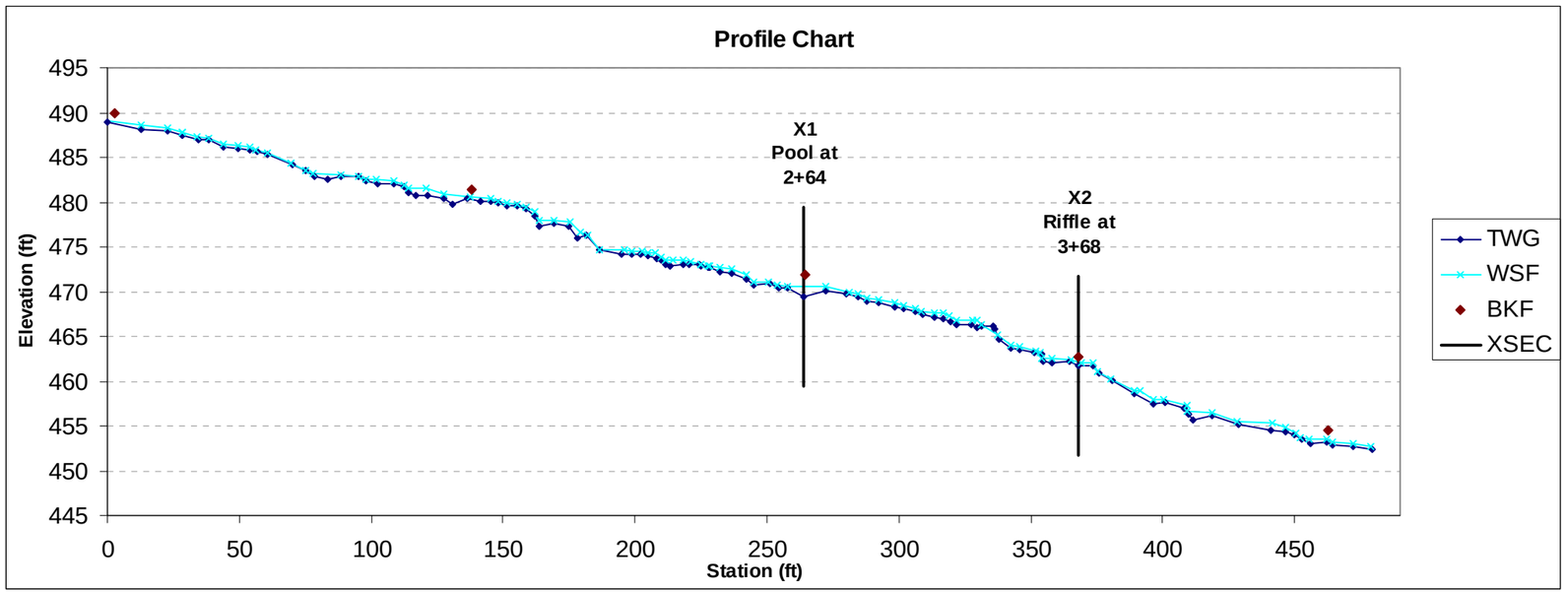
Unnamed Tributary 1 of
Right Fork of Hell Creek
Permanent Intermittent
(UT1RFHCPI)
Profile and Cross-section Data



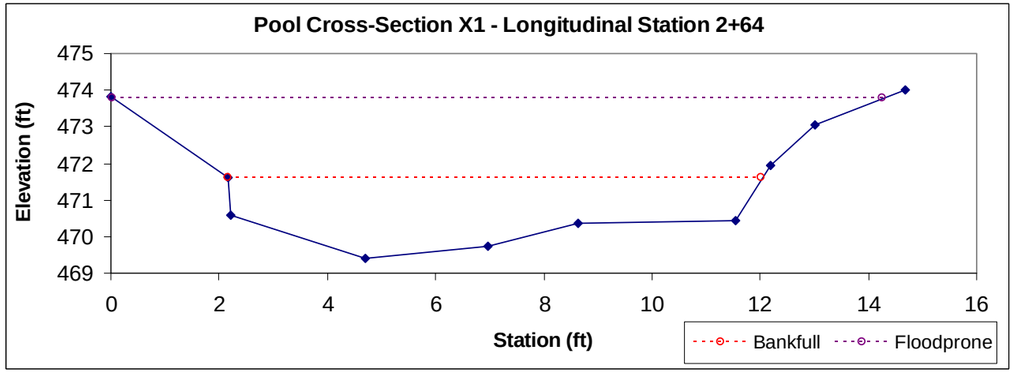
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A5a+	2.9	6.8	0.4	0.6	15.8	2.8	1.9	458.3	459.4



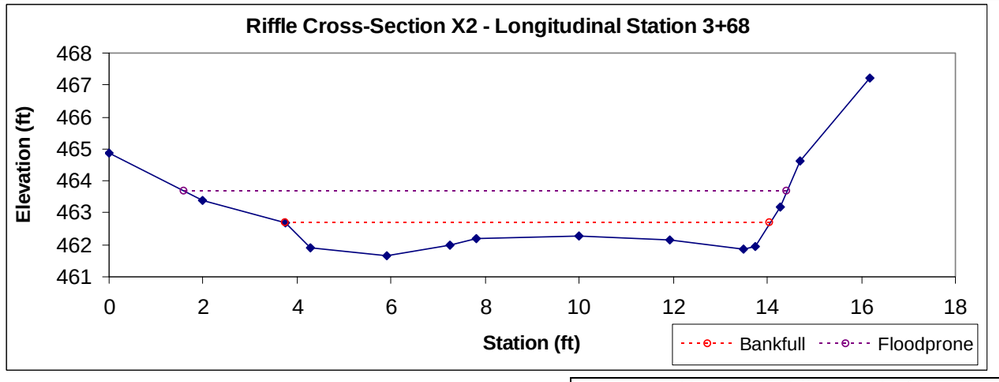
Unnamed Tributary 1 of
Right Fork of Hell Creek
Permanent Ephemeral
(UT1RFHCPE)
Profile and Cross-section Data



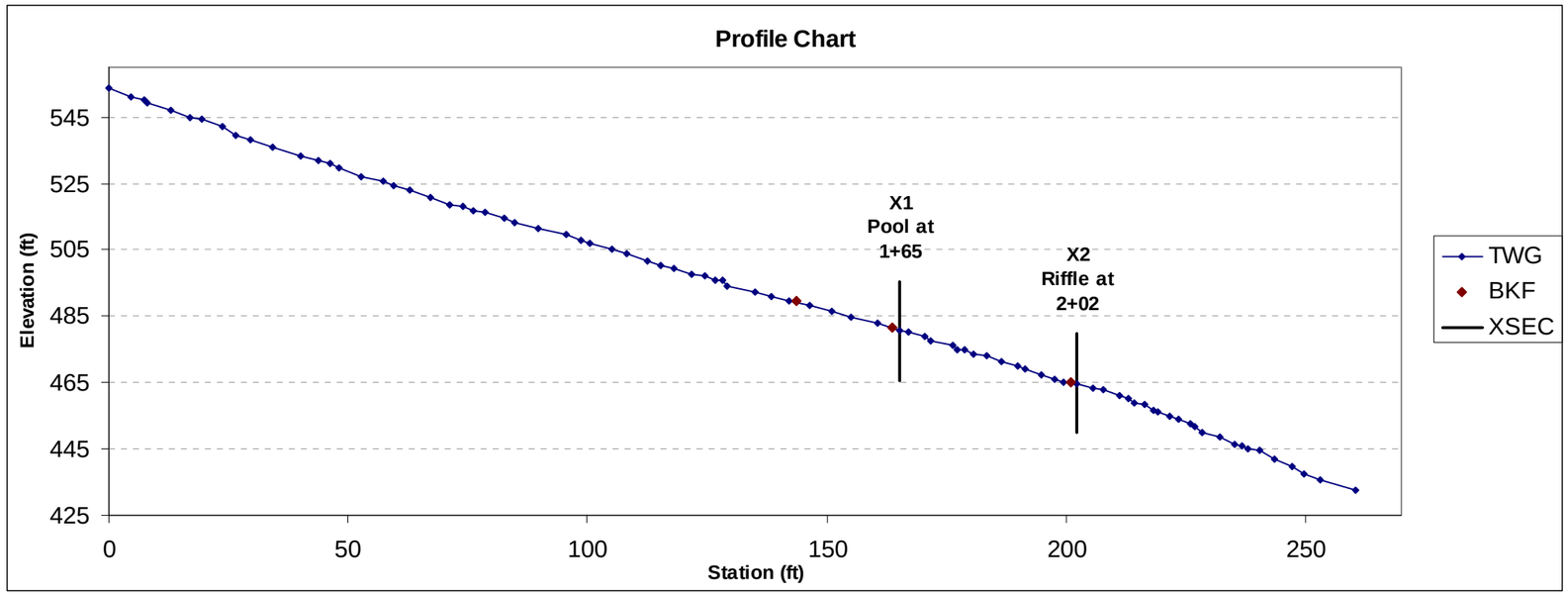
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A4	14.9	9.9	1.5	2.2	6.5	2.0	1.4	471.6	473.8



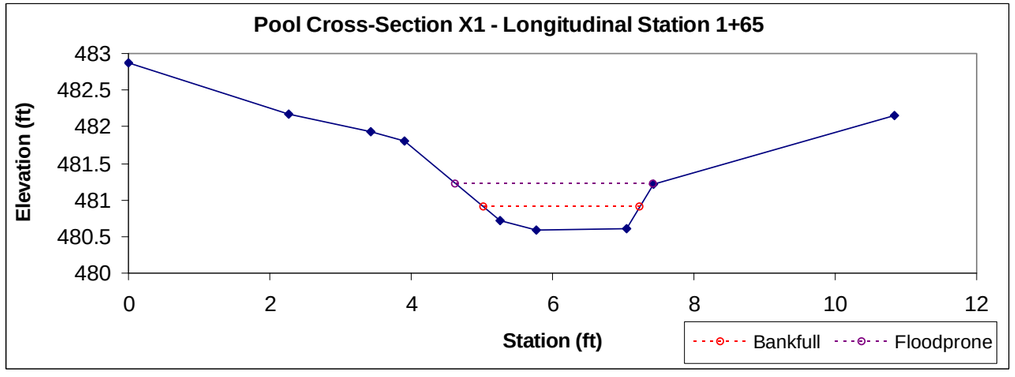
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A4	6.3	10.3	0.6	1.0	16.8	3.1	1.2	462.7	464.9



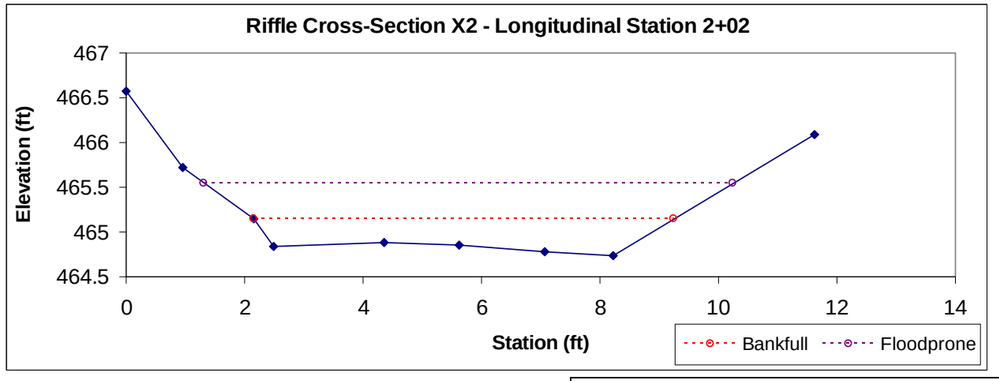
Unnamed Tributary 4 of
Right Fork of Hell Creek
Permanent Intermittent
(UT4RFHCPI)
Profile and Cross-section Data



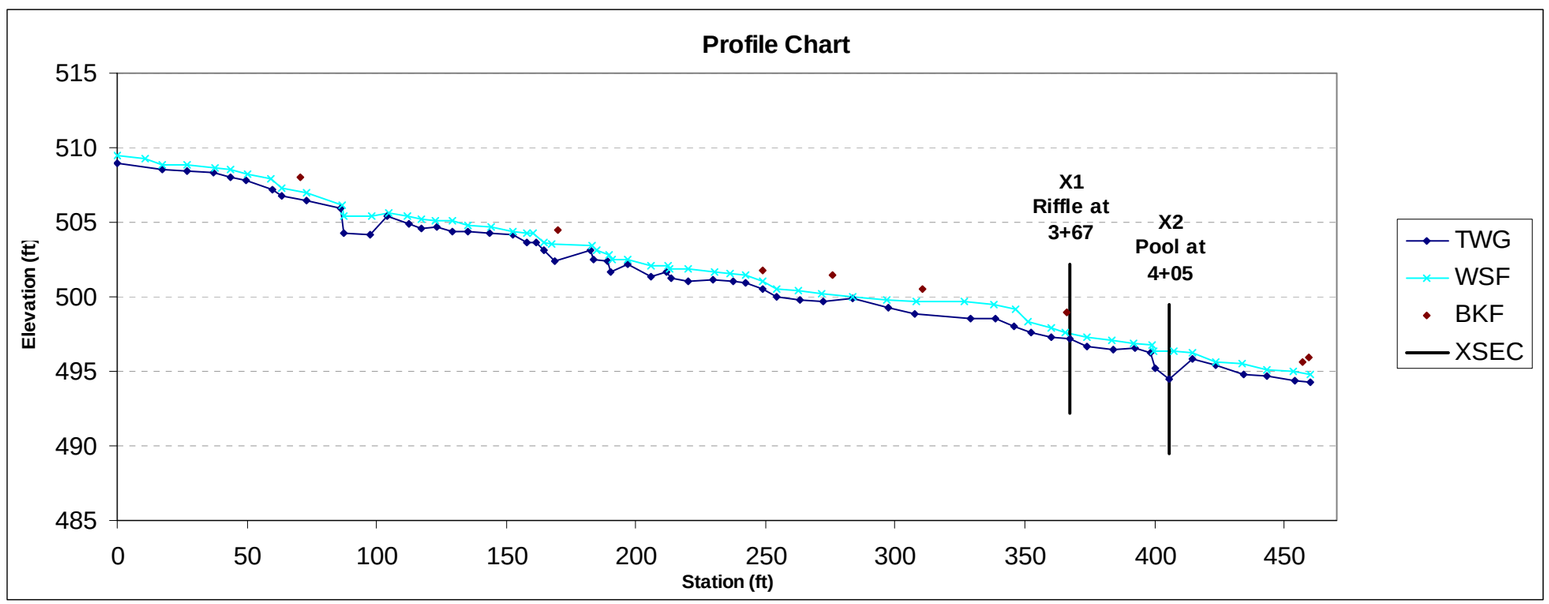
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A4a+	0.6	2.2	0.3	0.3	8.6	2.0	1.3	480.9	481.2



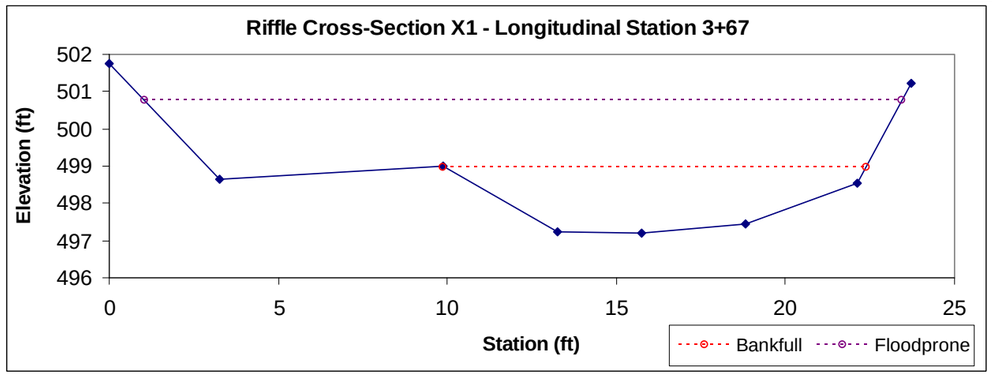
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A4a+	2.1	7.1	0.3	0.4	24.4	3.4	1.3	465.1	466.1



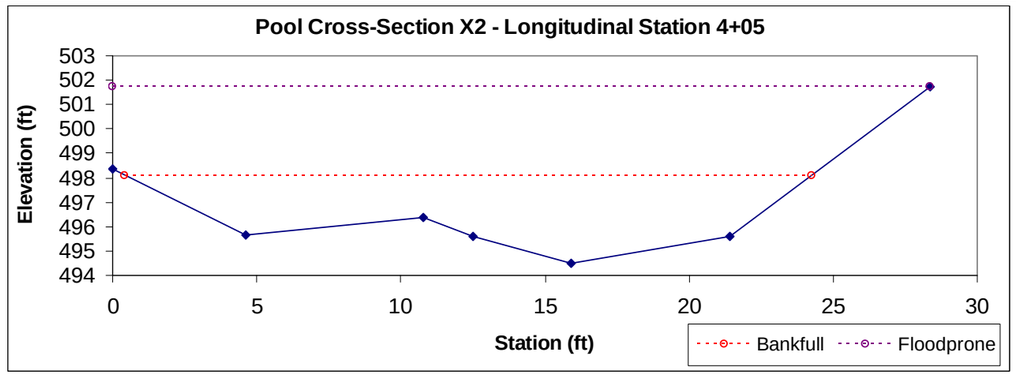
Unnamed Tributary 10 of
Right Fork of Hell Creek
Permanent Intermittent
(UT10RFHCPI)
Profile and Cross-section Data



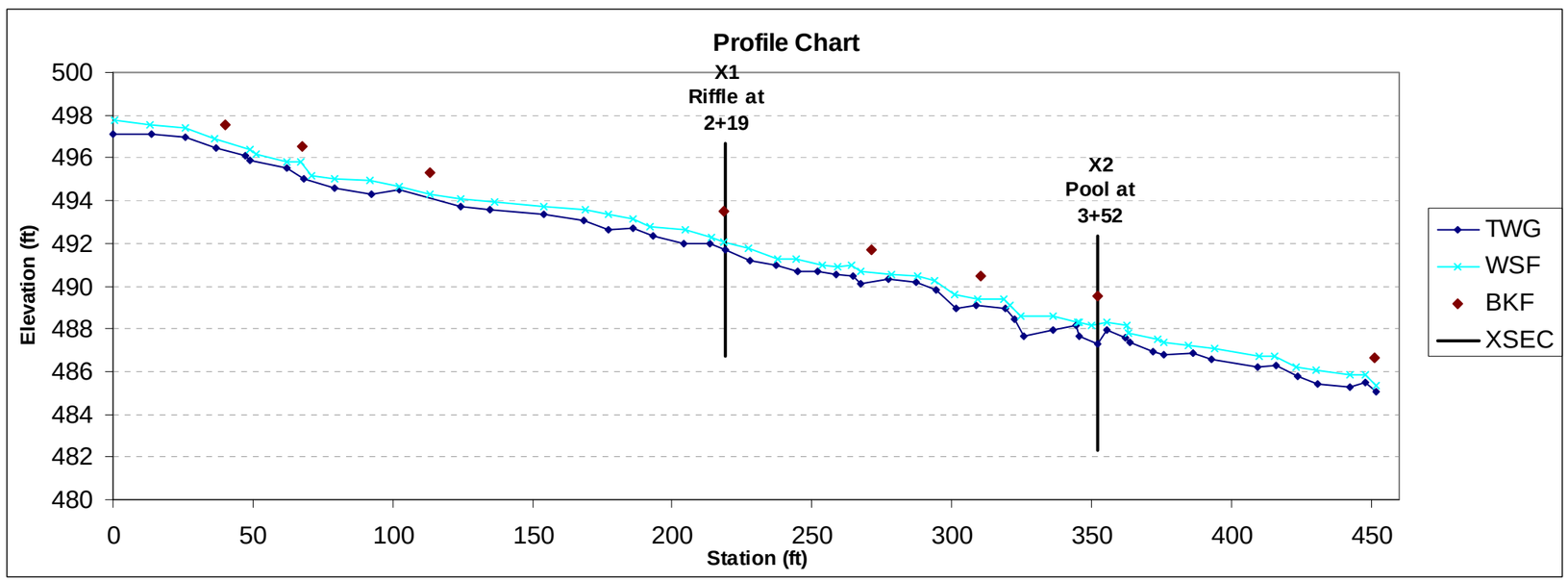
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	B4	15.7	12.5	1.3	1.8	9.9	2.3	1.8	499.0	501.2



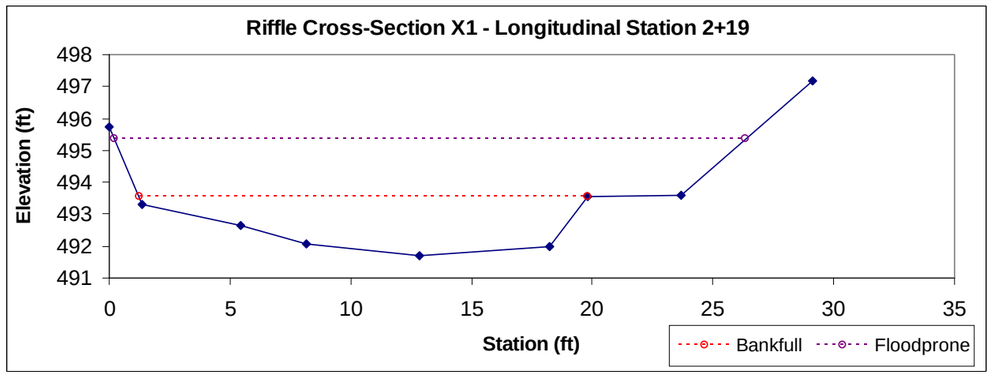
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	B4	52.3	23.8	2.2	3.6	10.9	1.1	1.2	498.1	498.4



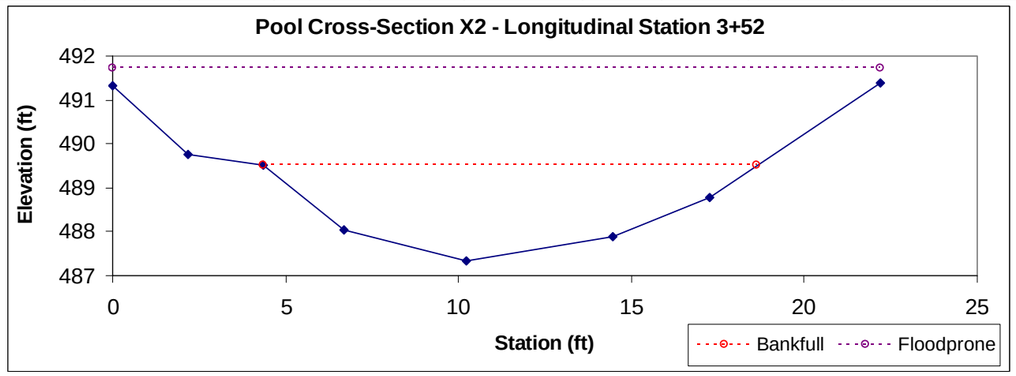
Left Fork of Hell Creek
Temporary Perennial 1
(LFHCTP1)
Profile and Cross-section Data



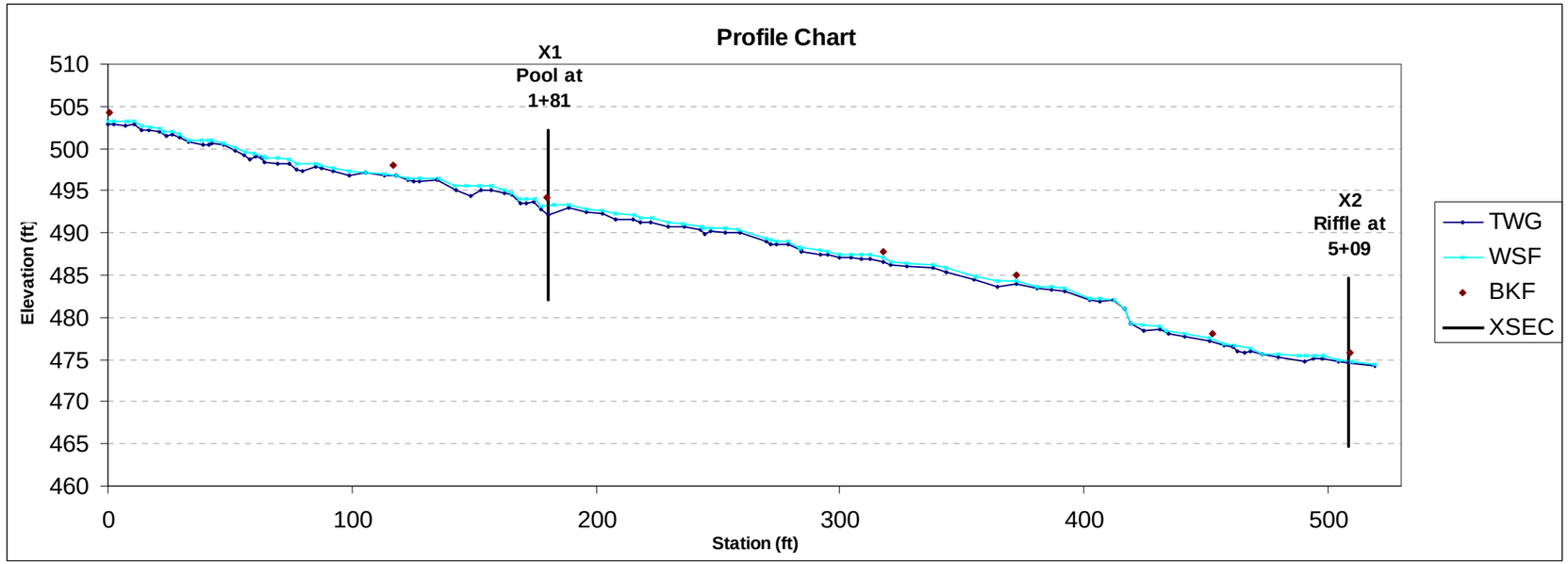
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	B4	23.5	18.6	1.3	1.8	14.6	2.2	1.4	493.5	495.7



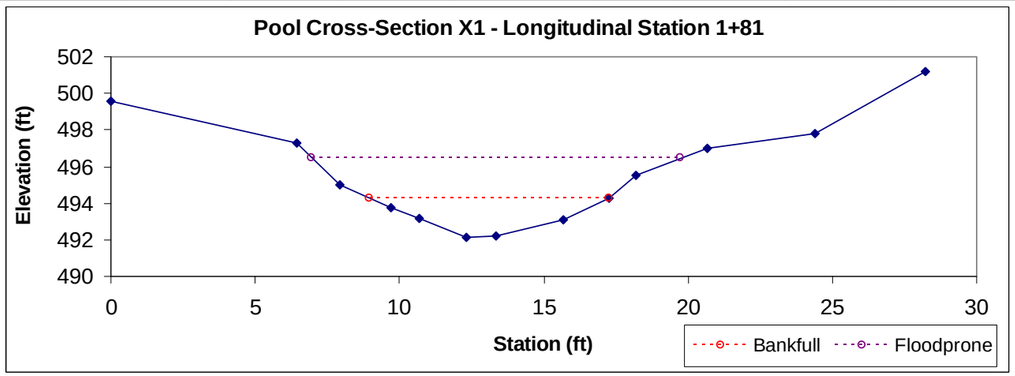
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	B4	20.1	14.3	1.4	2.2	10.8	1.8	1.6	489.5	491.3



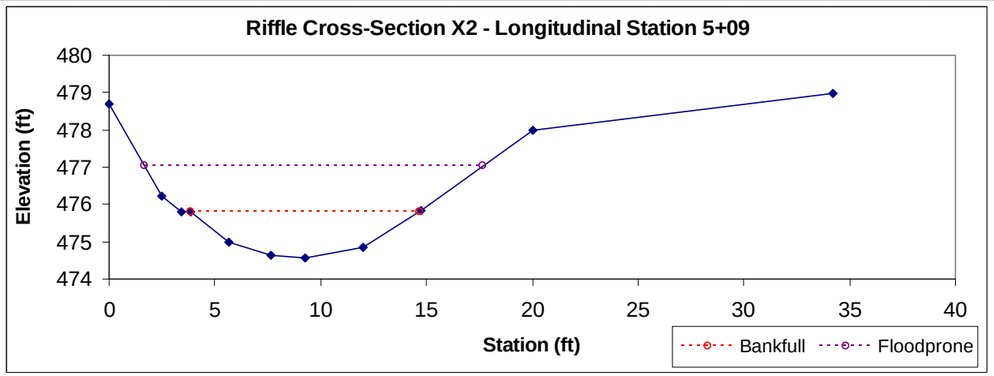
Left Fork of Hell Creek
Temporary Perennial 2
(LFHCTP2)
Profile and Cross-section Data



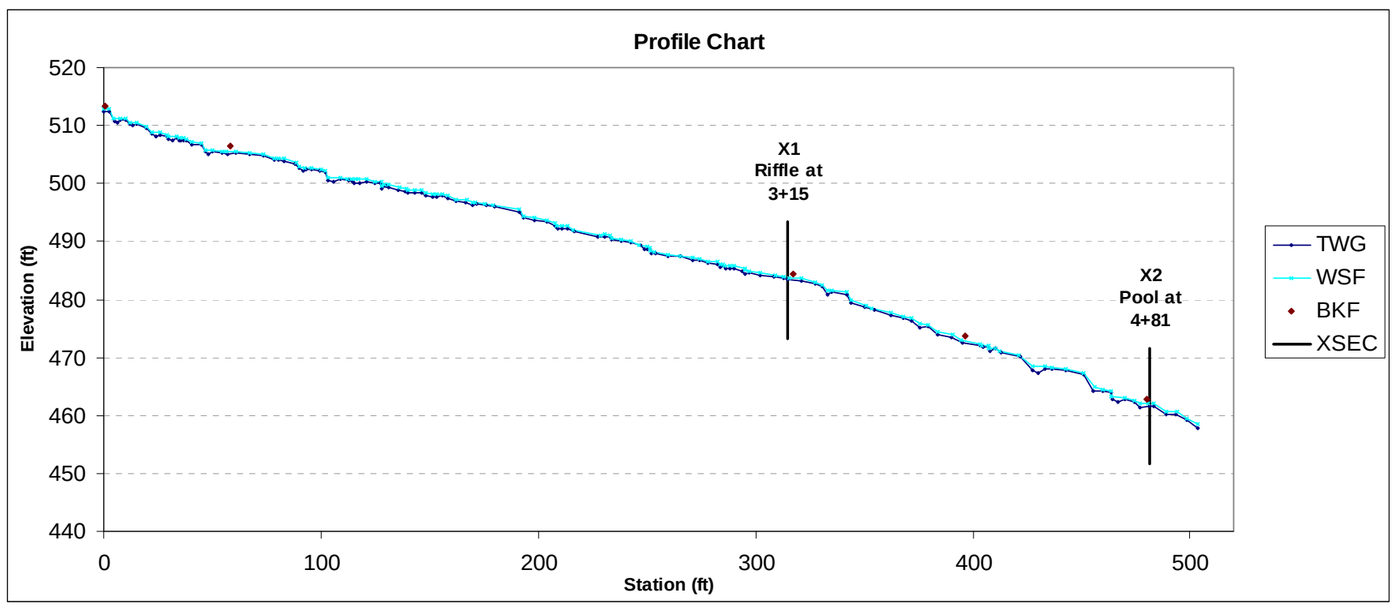
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	B4/1a	10.8	8.3	1.3	2.2	6.4	2.2	1.5	494.3	497.0



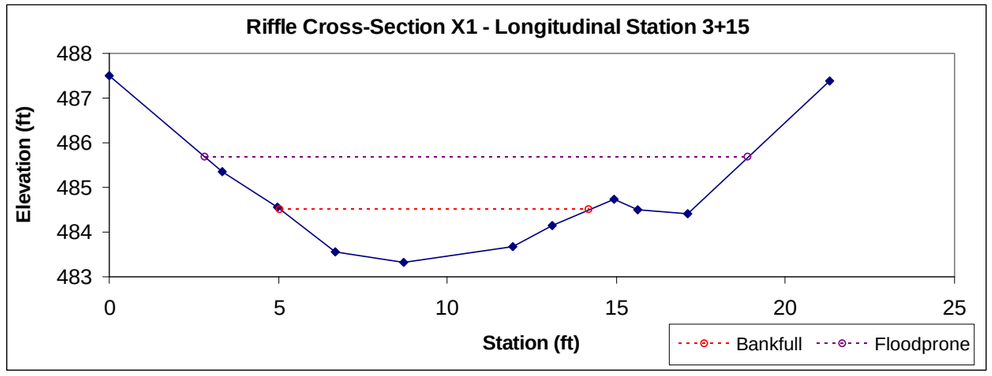
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	B4/1a	9.0	10.8	0.8	1.2	13.1	1.0	1.5	475.8	475.8



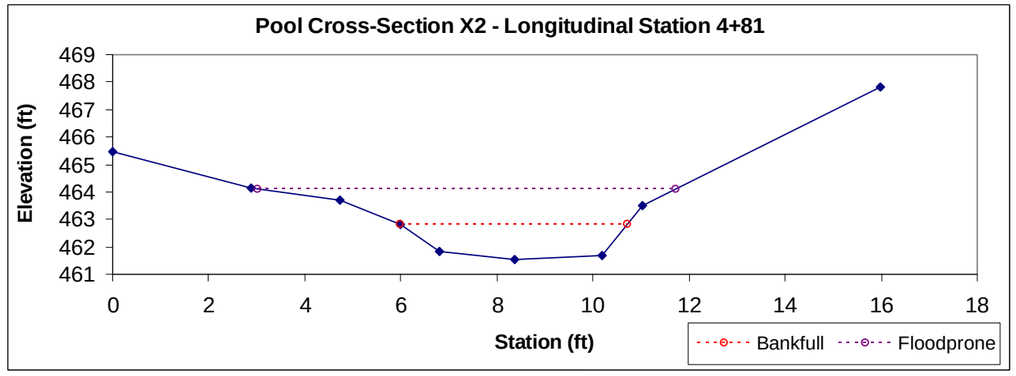
Left Fork of Hell Creek
Permanent Perennial
(LFHCPP)
Profile and Cross-section Data



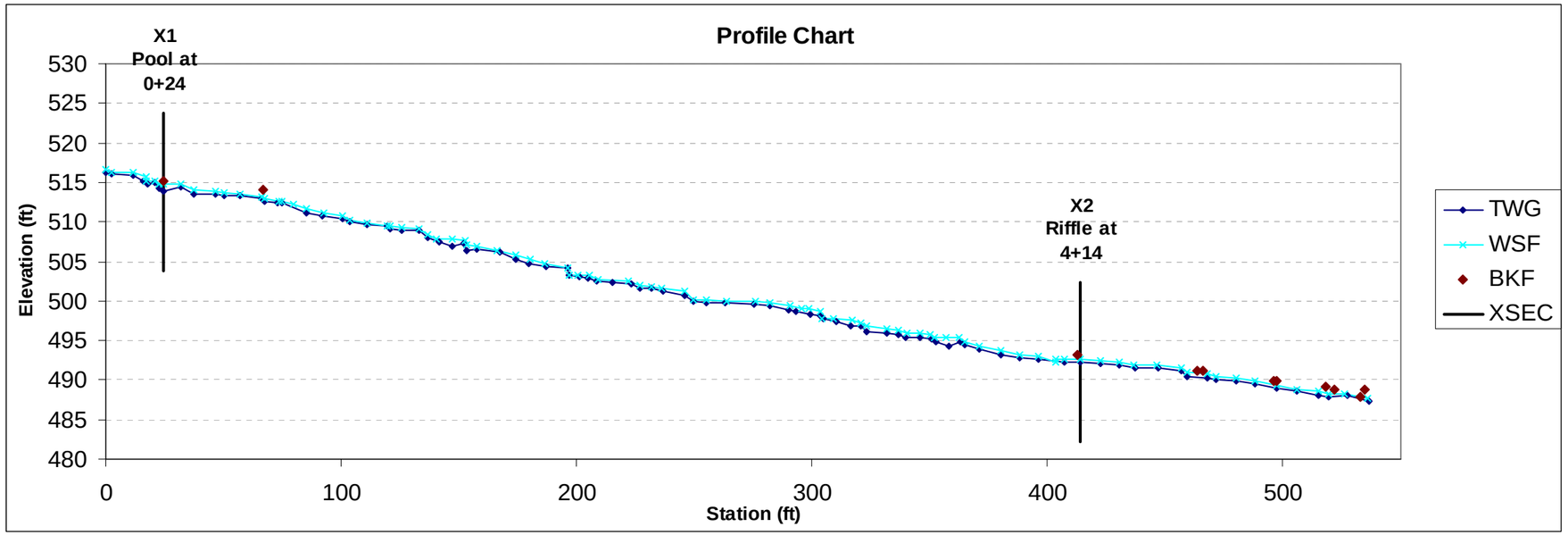
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A4	7.1	9.1	0.8	1.2	11.8	1.0	1.8	484.5	484.6



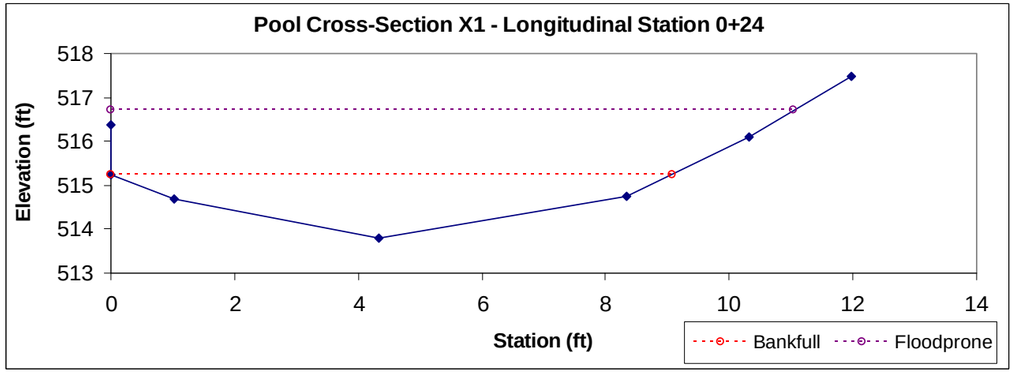
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A4	4.7	4.7	1.0	1.3	4.8	1.5	1.8	462.8	463.5



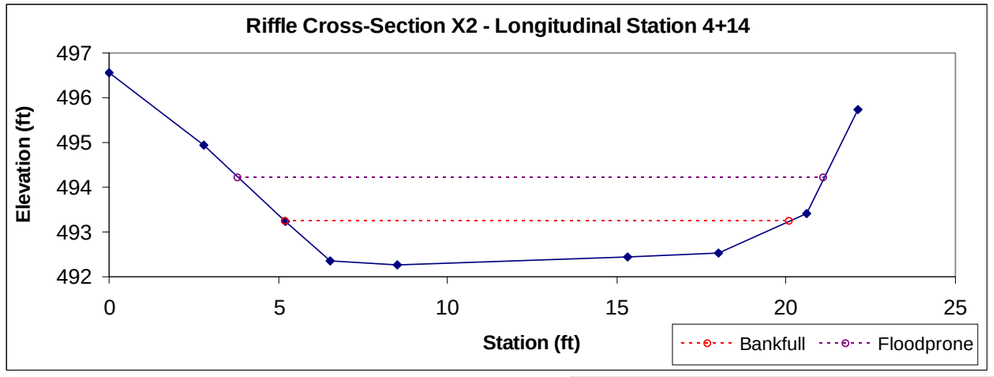
Left Fork of Hell Creek
Permanent Intermittent
(LFHCPI)
Profile and Cross-section Data



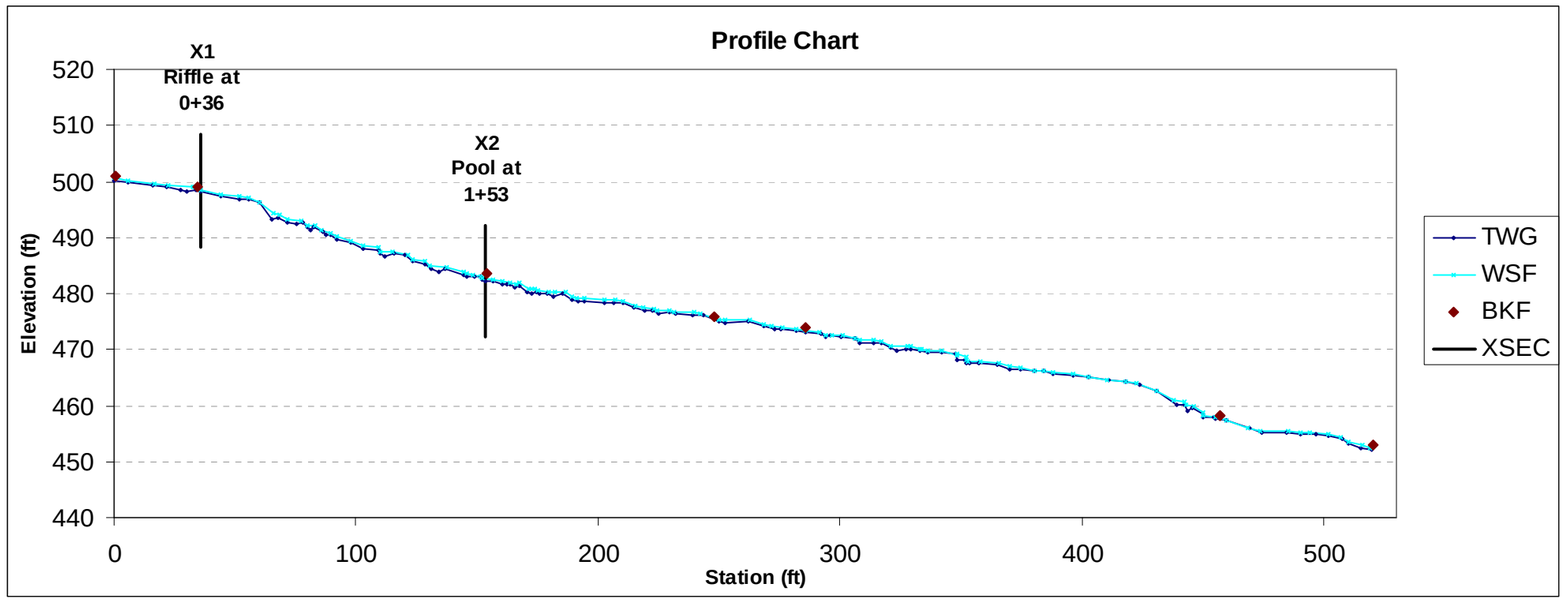
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A4/3	7.7	9.1	0.9	1.5	10.7	1.6	1.2	515.3	516.1



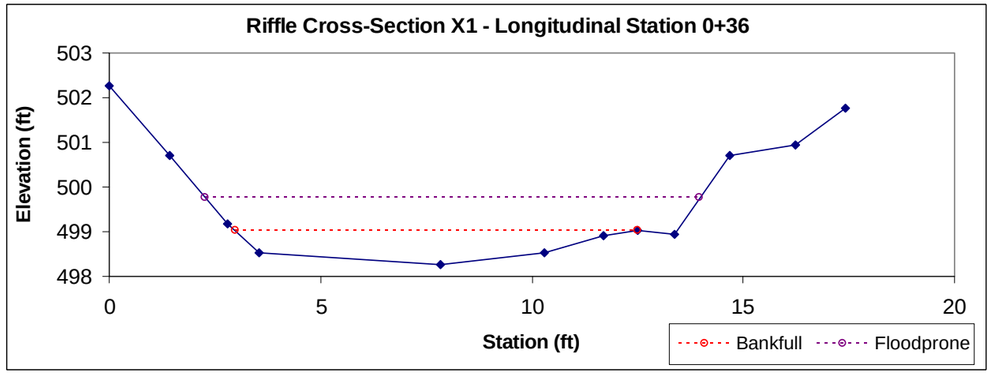
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A4/3	11.3	14.9	0.8	1.0	19.7	3.5	1.2	493.3	495.7



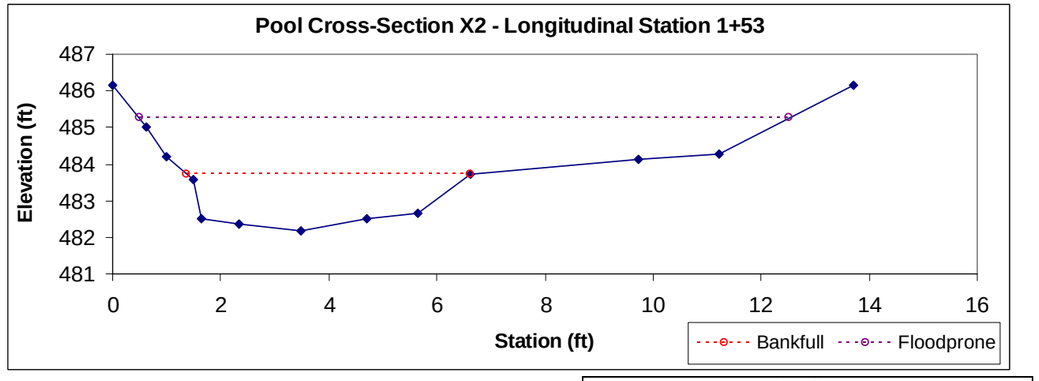
Unnamed Tributary 1 of
Left Fork of Hell Creek
Temporary Perennial
(UT1LFHCTP)
Profile and Cross-section Data



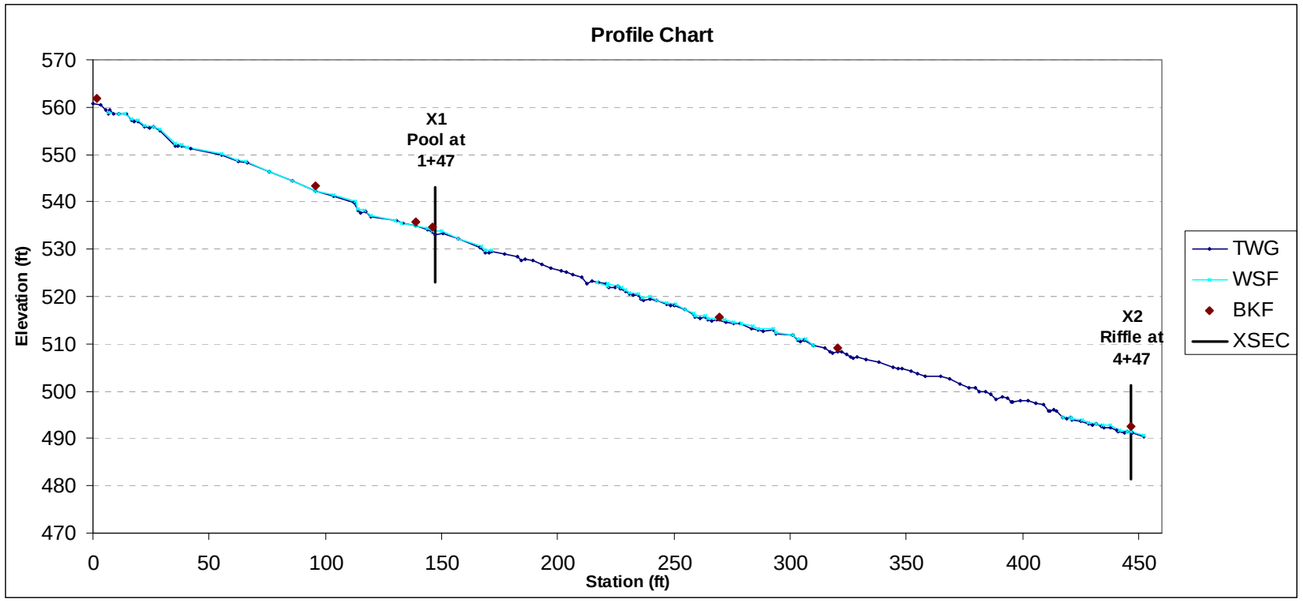
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A4/3	4.7	9.5	0.5	0.7	19.1	4.7	1.2	499.0	501.8



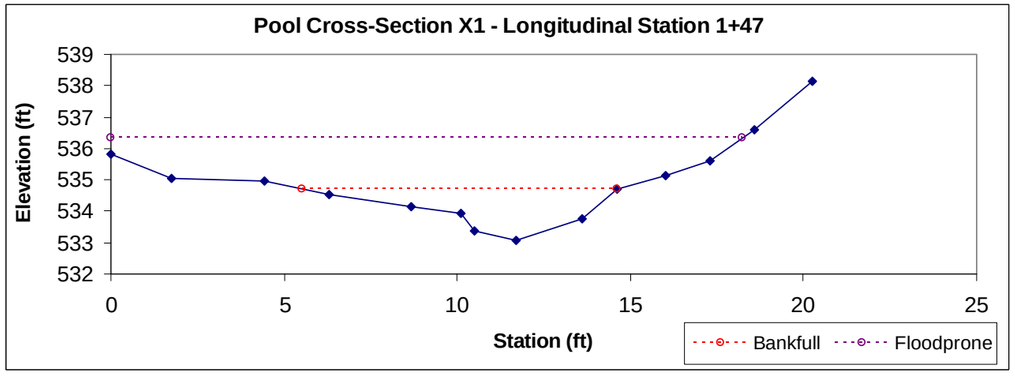
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A4/3	5.9	5.2	1.1	1.5	4.6	2.6	2.3	483.7	486.1



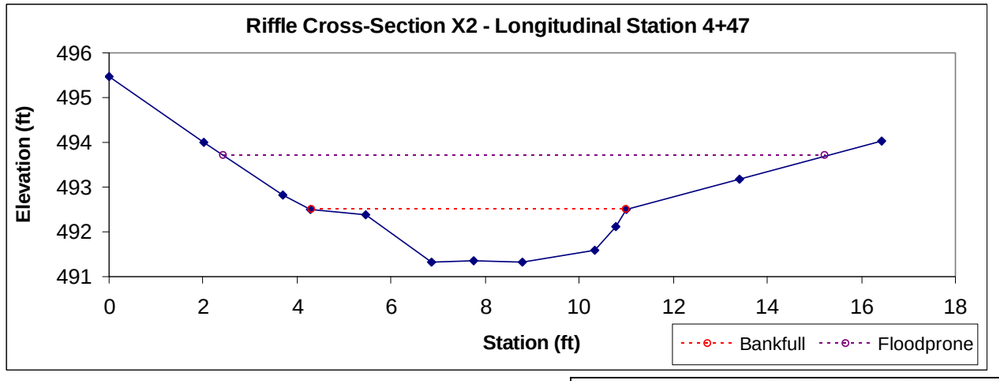
Unnamed Tributary 1 of
Left Fork of Hell Creek
Permanent Perennial
(UT1LFHCPP)
Profile and Cross-section Data



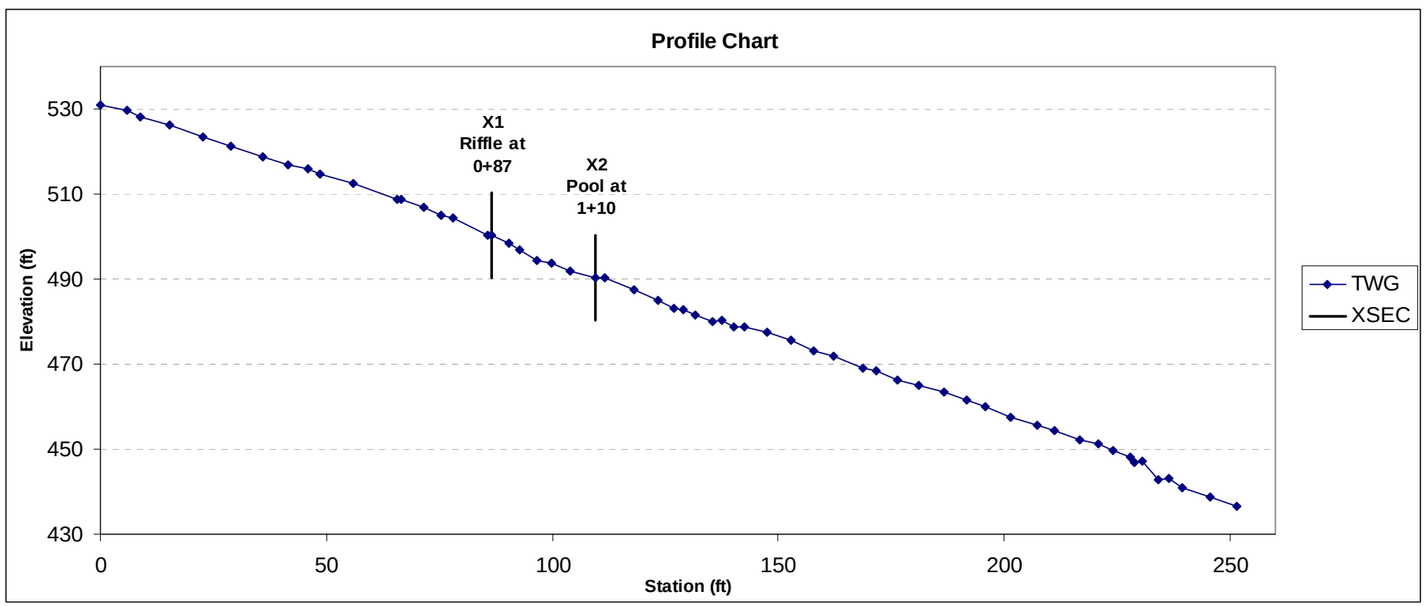
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A4a+	7.0	9.1	0.8	1.6	11.8	1.7	2.0	534.7	535.8



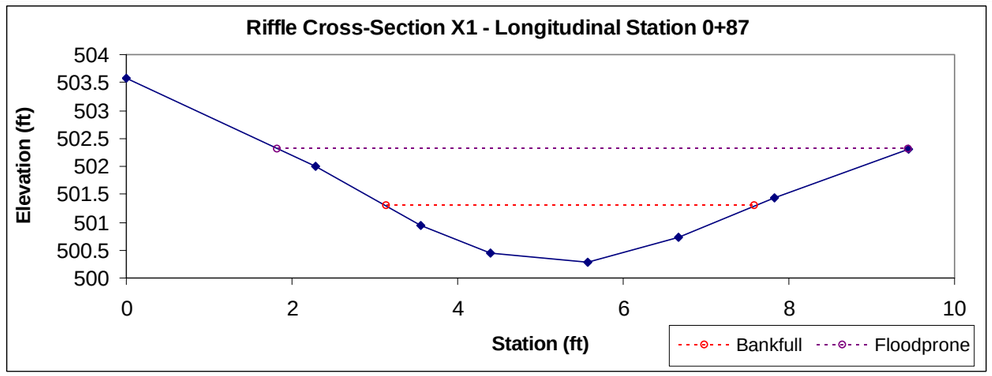
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A4a+	5.2	6.7	0.8	1.2	8.6	1.0	1.9	492.5	492.5



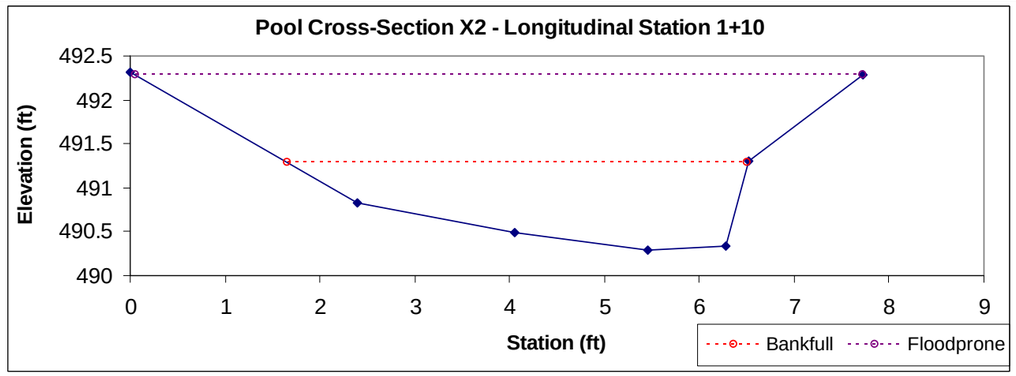
Unnamed Tributary 1 of
Left Fork of Hell Creek
Permanent Intermittent
(UT1LFHCPI)
Profile and Cross-section Data



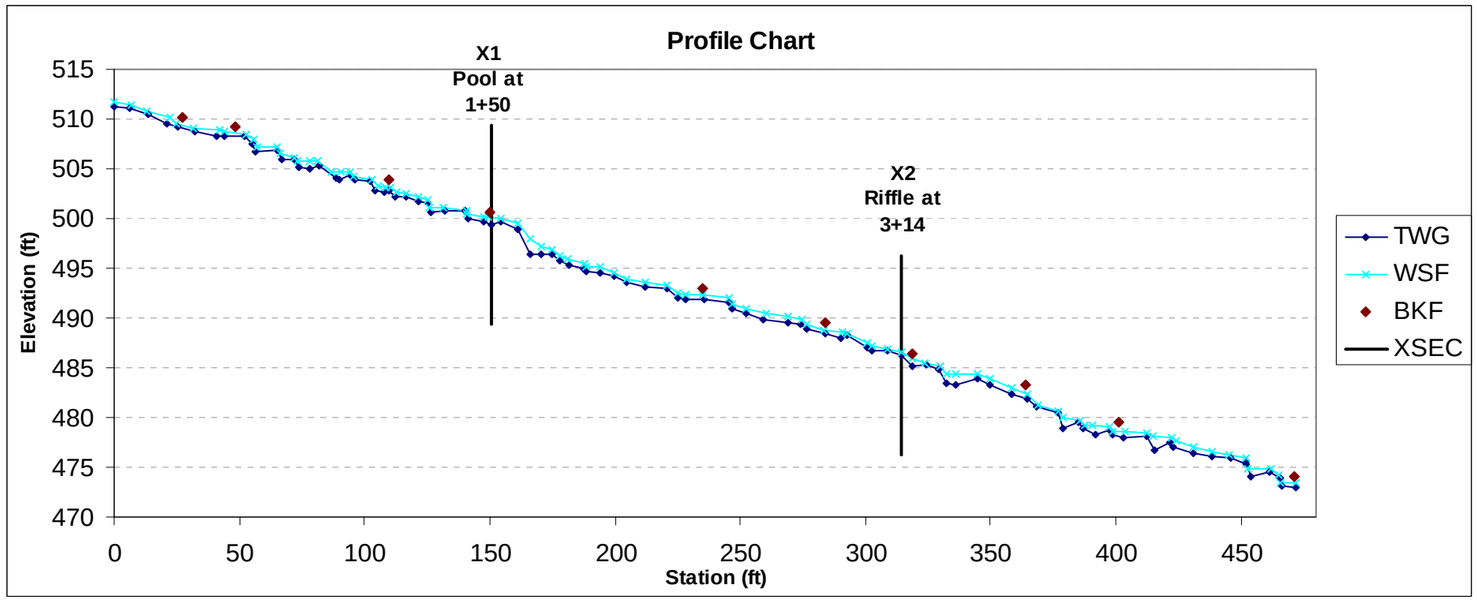
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A4/1a+	2.8	4.5	0.6	1.0	7.1	0.7	1.7	501.3	501.0



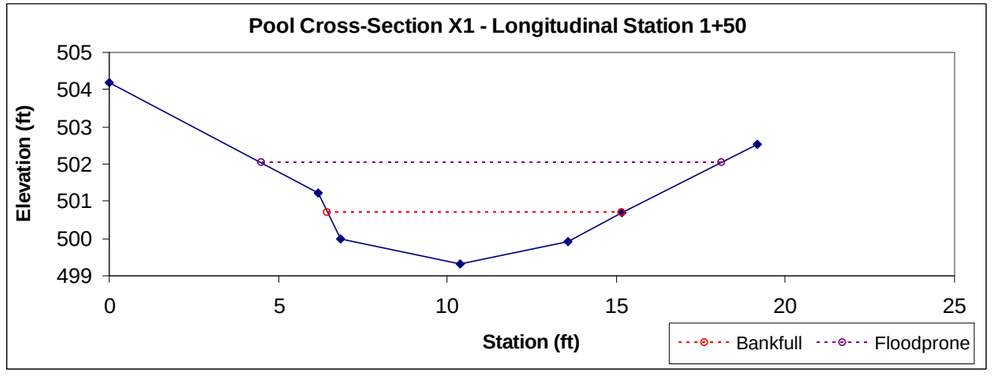
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A4/1a+	3.4	4.9	0.7	1.0	7.0	2.0	1.6	491.3	492.3



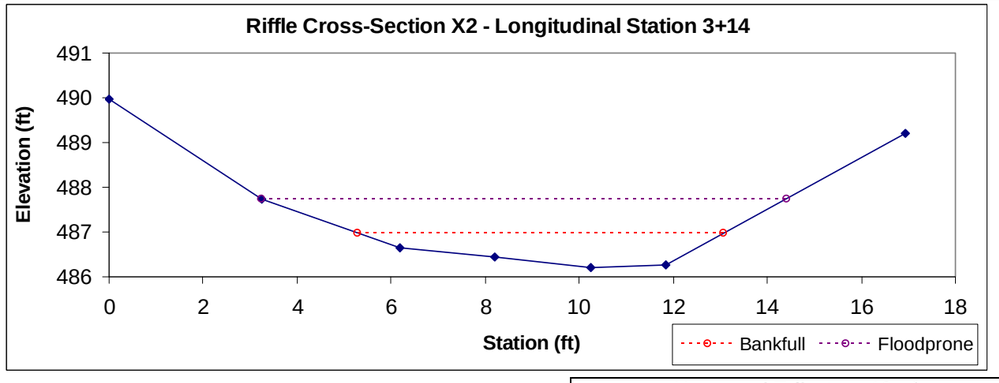
Unnamed Tributary 2 of
Unnamed Tributary 1 of
Left Fork of Hell Creek
Permanent Intermittent
(UT2UT1LFHCPI)
Profile and Cross-section Data



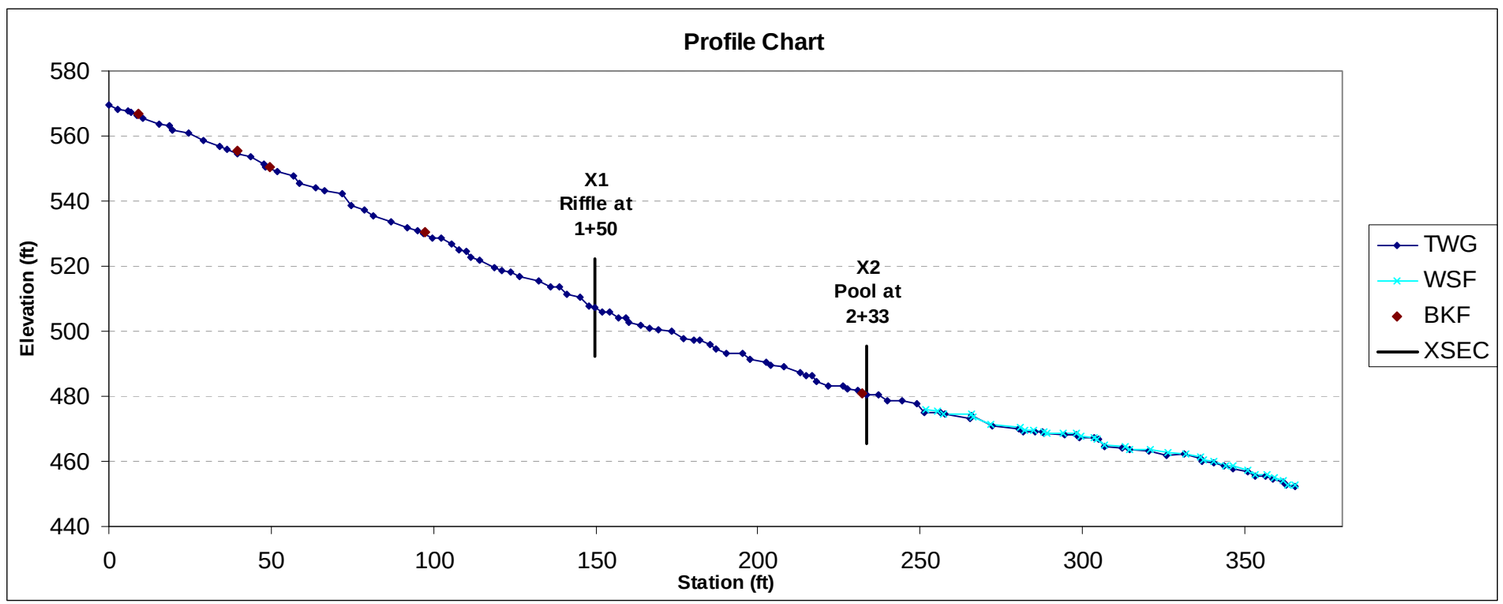
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	B3/4a	7.8	8.7	0.9	1.3	9.7	1.4	1.6	500.7	501.2



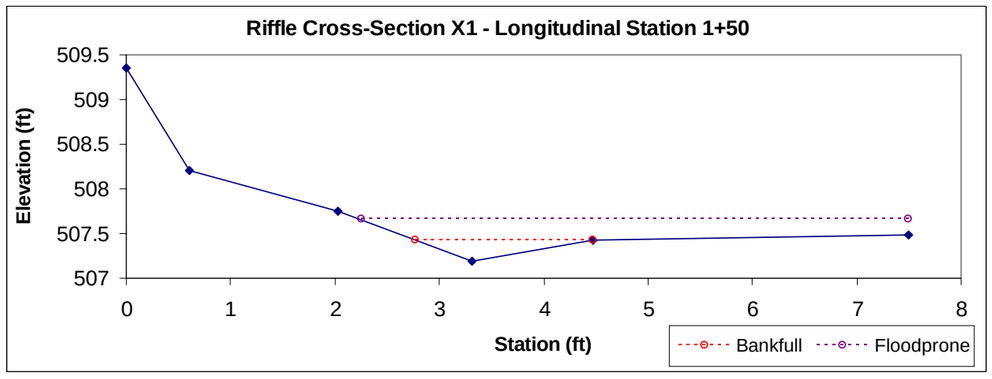
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	B3/4a	4	7.8	0.5	0.8	15.2	2.0	1.4	487.0	488.0



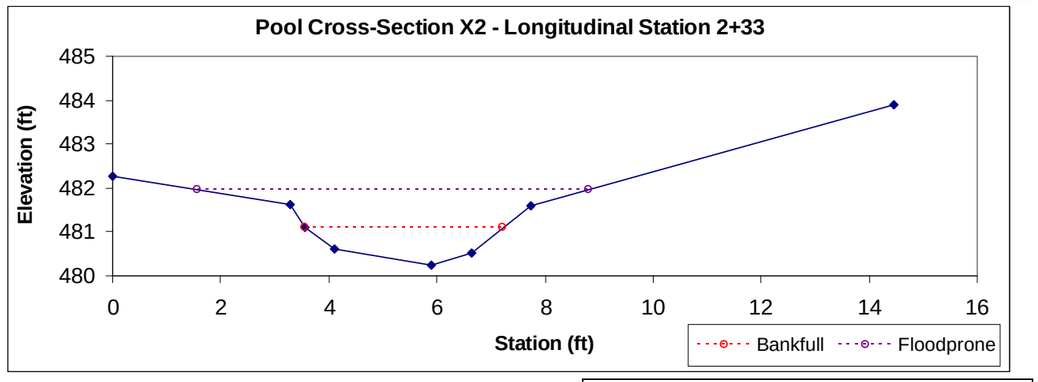
Unnamed Tributary 10 of
Left Fork of Hell Creek
Permanent Perennial
(UT10LFHCPP)
Profile and Cross-section Data



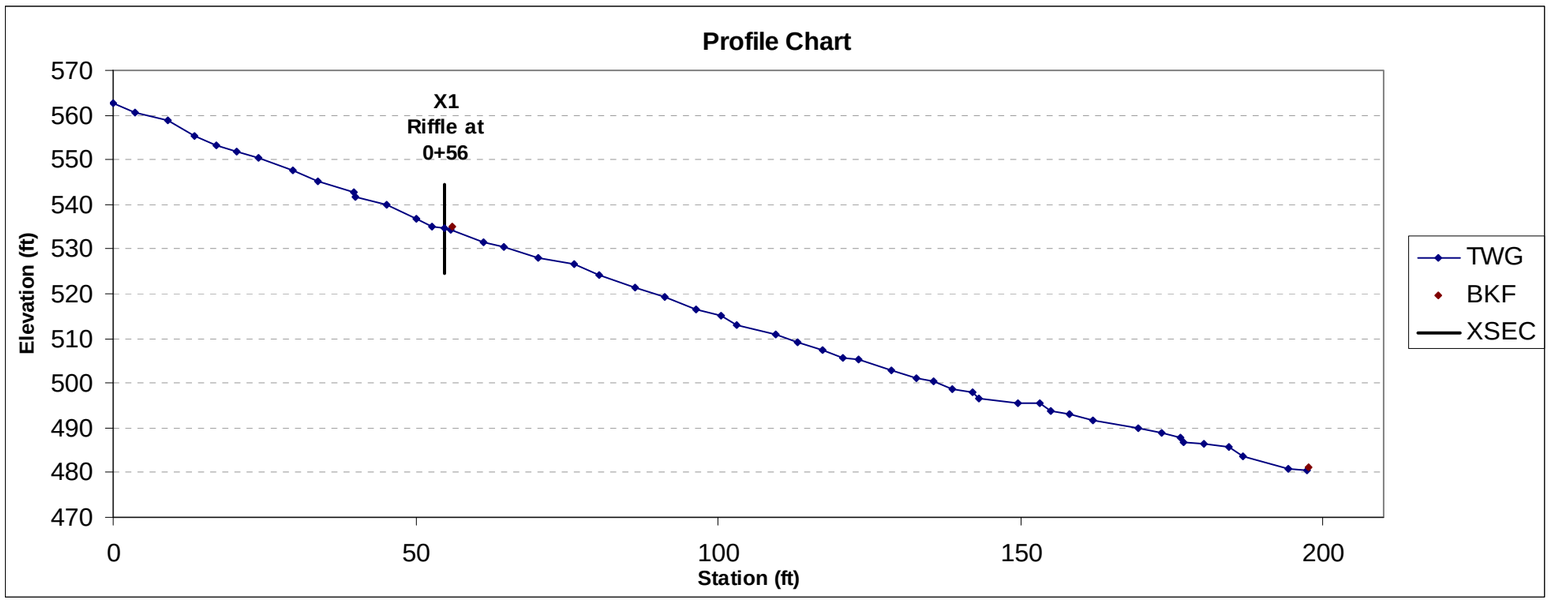
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A4/1a+	0.2	1.8	0.1	0.2	15.4	1.2	3.0	507.4	507.5



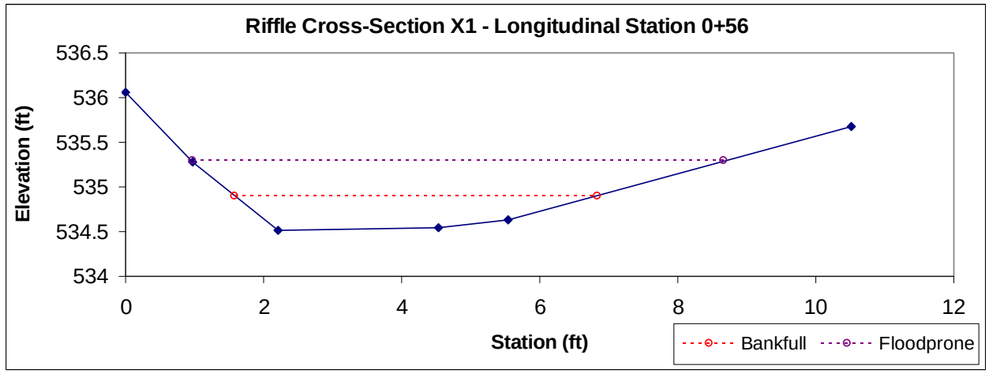
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A4/1a+	2.0	3.7	0.6	0.9	6.6	1.6	2	481.1	481.6



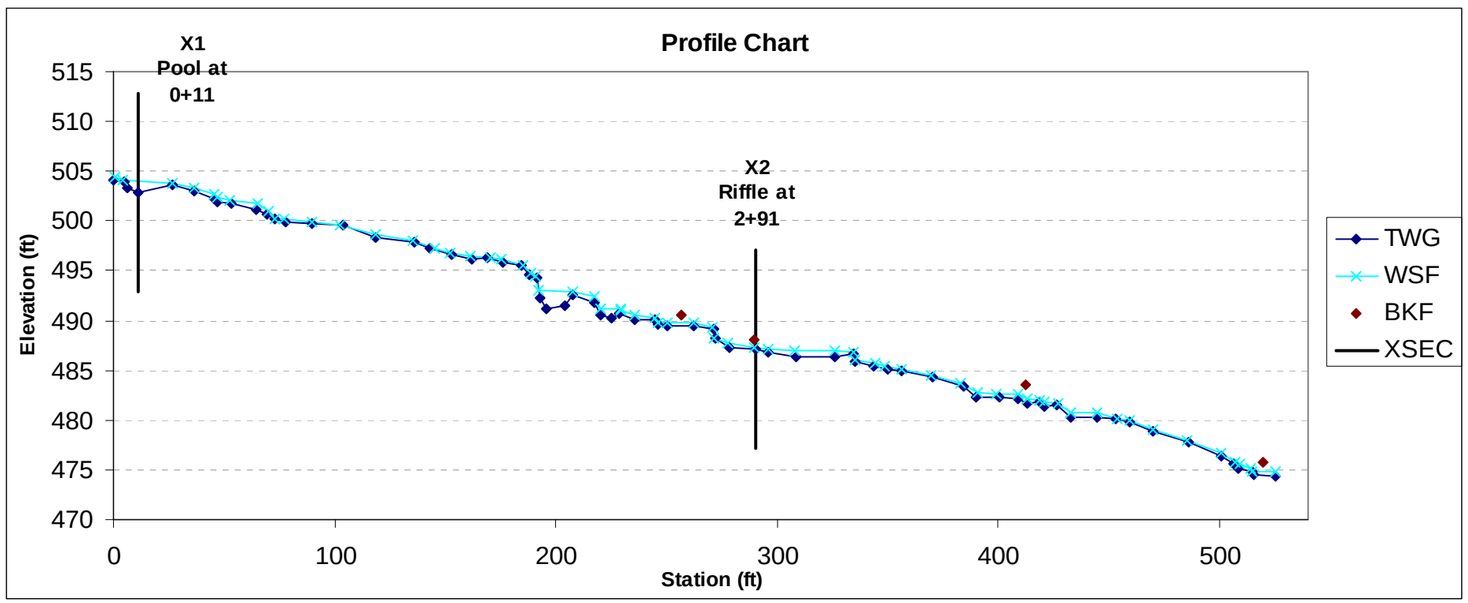
Unnamed Tributary 1 of
Unnamed Tributary 10 of
Left Fork of Hell Creek
Permanent Intermittent
(UT1UT10LFHCPI)
Profile and Cross-section Data



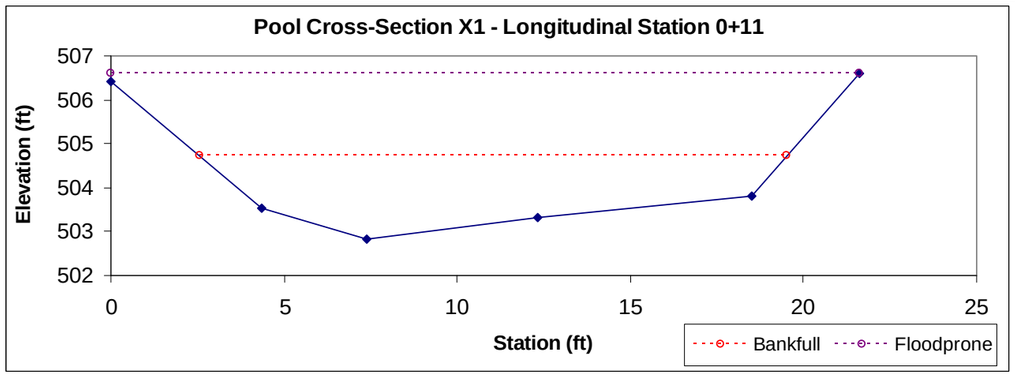
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A3a+	1.5	5.2	0.2	0.4	18.5	2.0	1.5	534.9	535.3



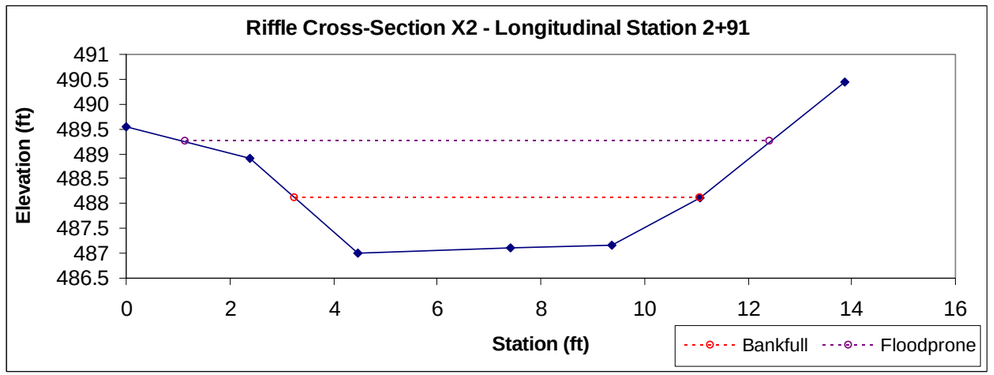
Unnamed Tributary 1 of
Unnamed Tributary 1 of
Unnamed Tributary 10 of
Left Fork of Hell Creek
Permanent Intermittent
(UT1UT1UT10LFHCPI)
Profile and Cross-section Data



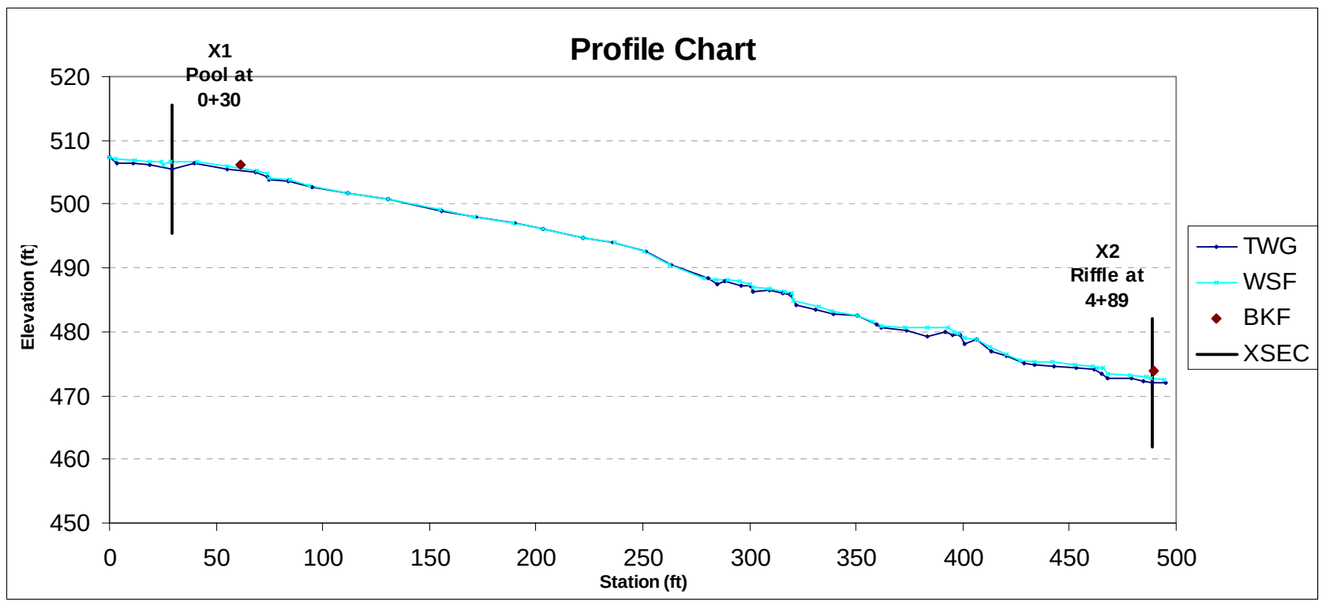
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	B4/1a	21.3	16.9	1.3	1.9	13.5	1.9	1.3	504.7	506.4



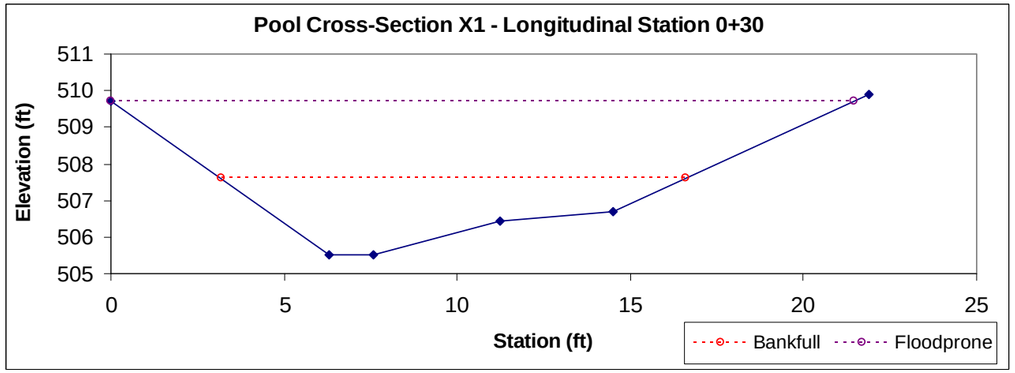
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	B4/1a	6.6	7.8	0.8	1.1	9.3	1.7	1.4	488.1	488.9



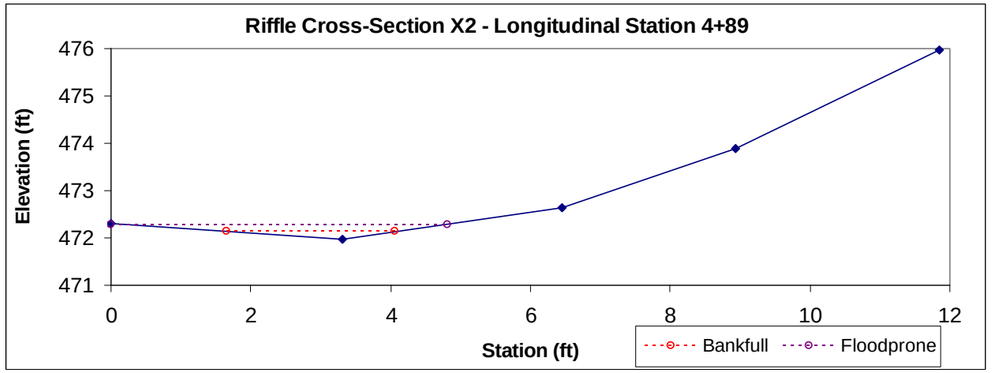
Pigeonroost Creek
Temporary Perennial
(PRCTP)
Profile and Cross-section Data



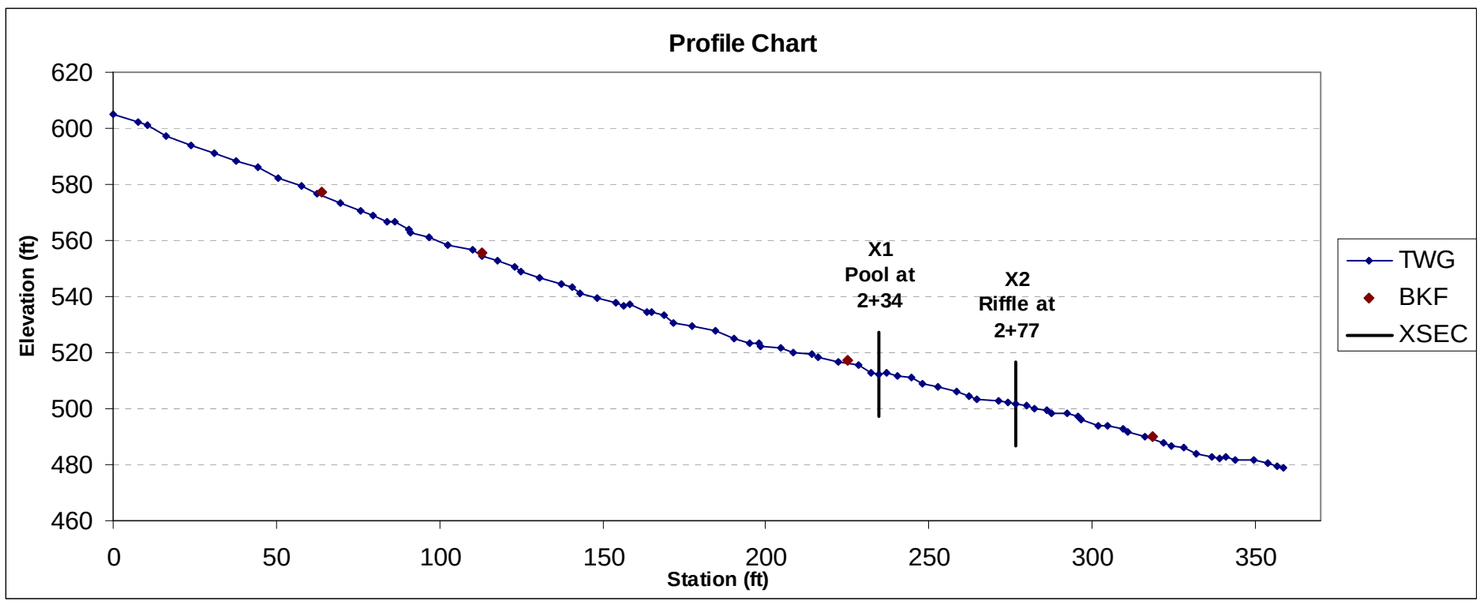
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	B3/1a	16.3	13.4	1.2	2.1	11.1	2.0	1.6	507.6	509.7



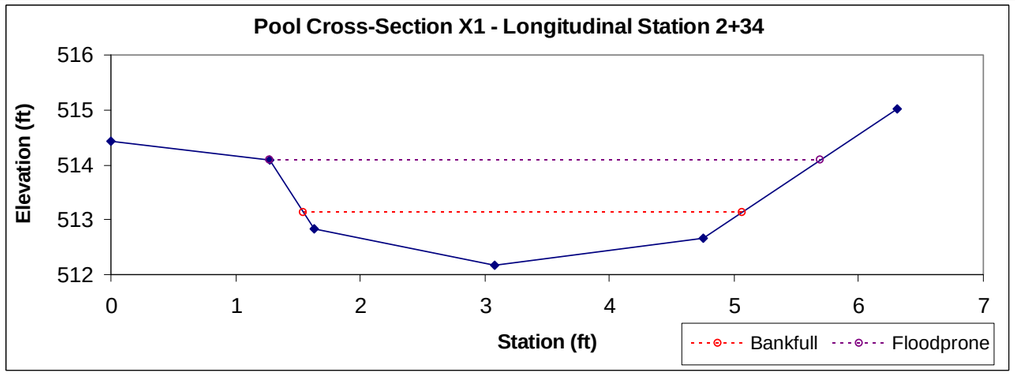
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	B3/1a	0.2	2.4	0.1	0.2	29.1	2.0	2.0	472.1	472.3



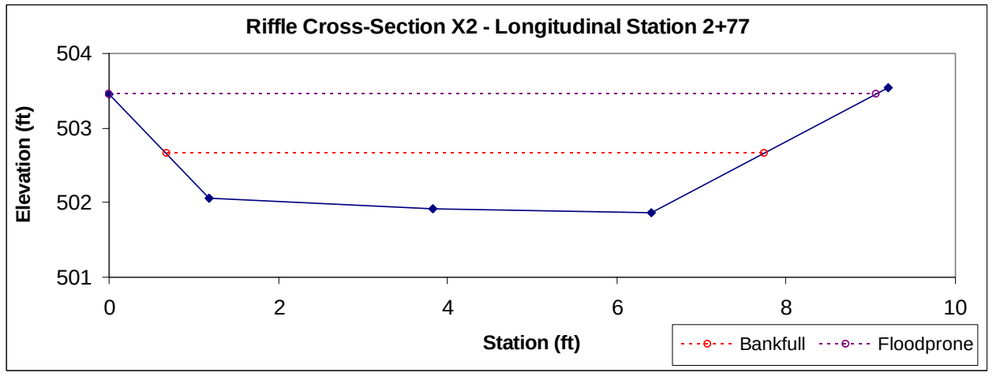
Pigeonroost Creek
Permanent Intermittent
(PRCPI)
Profile and Cross-section Data



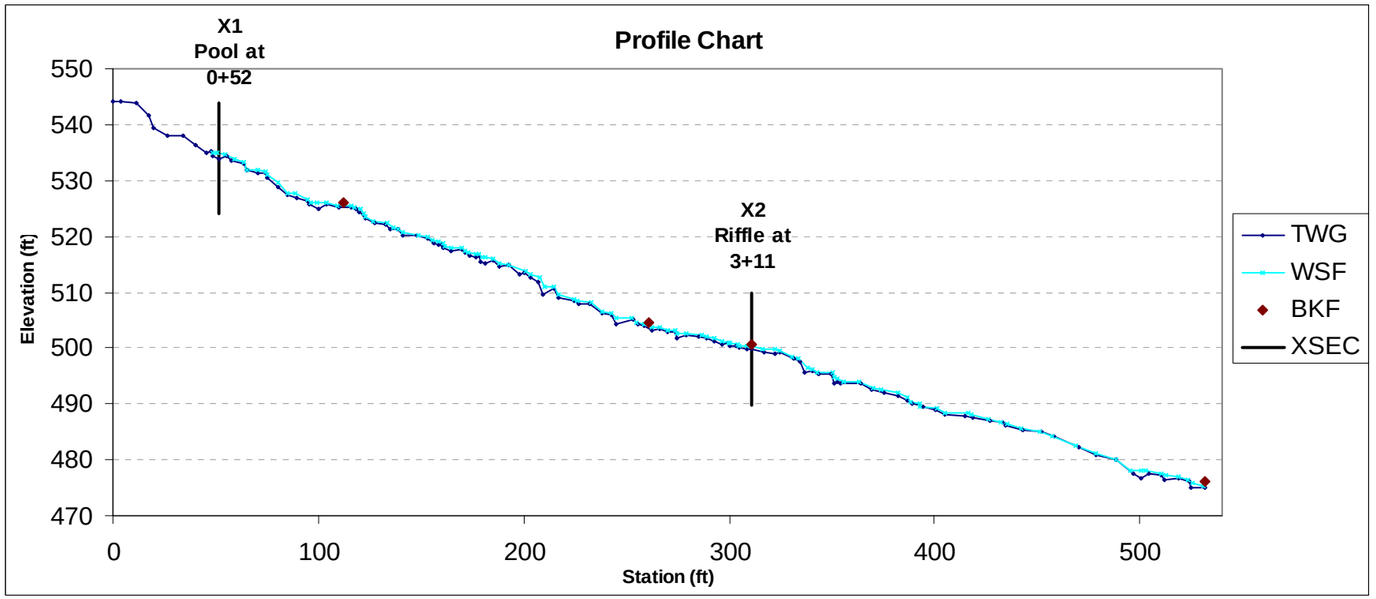
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A2a+	2.2	3.5	0.6	1.0	5.7	2.0	1.3	513.1	514.1



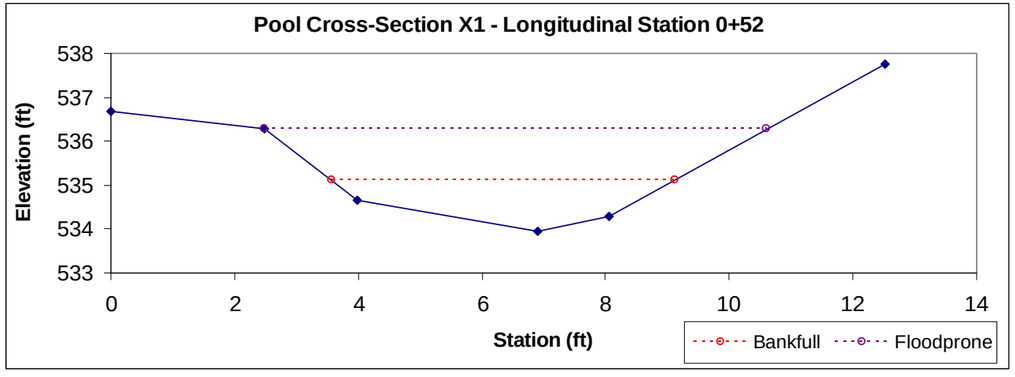
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A2a+	4.5	7.1	0.6	0.8	11.2	2.0	1.3	502.7	503.5



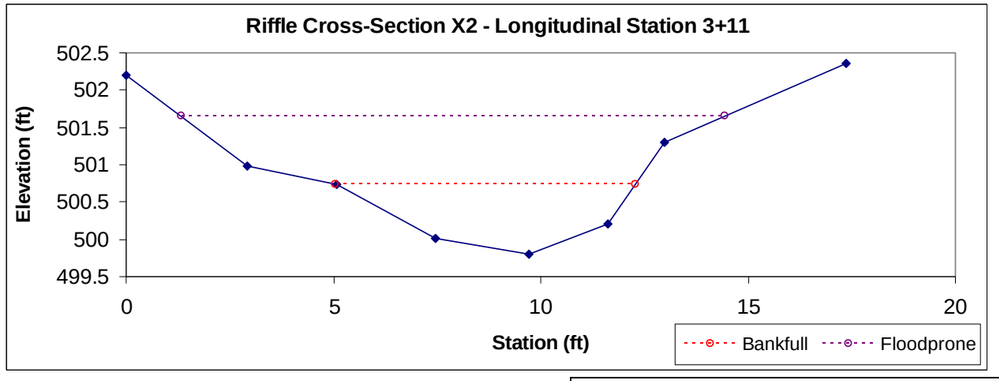
Unnamed Tributary 1 of
Unnamed Tributary 1 of
Pigeonroost Creek
Permanent Ephemeral
(UT1UT1PRCPE)
Profile and Cross-section Data



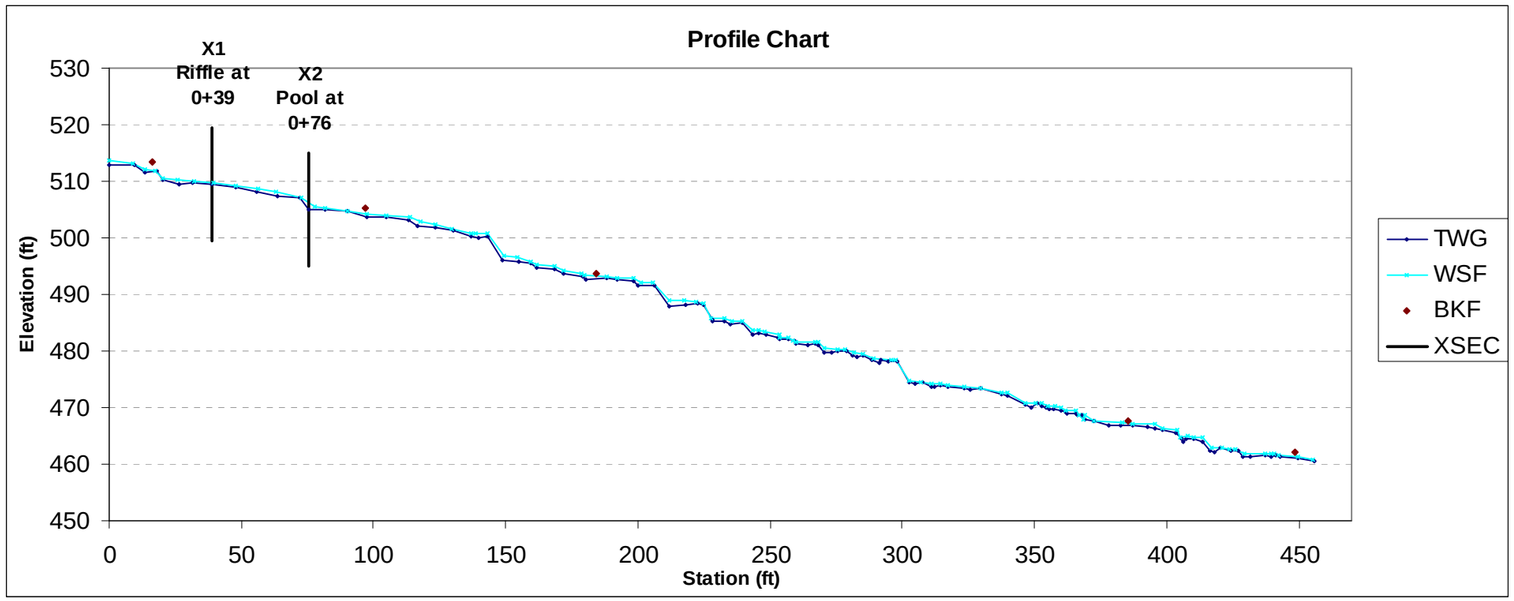
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	B3/1a	4.0	5.6	0.7	1.2	7.7	2.0	1.5	535.1	536.2



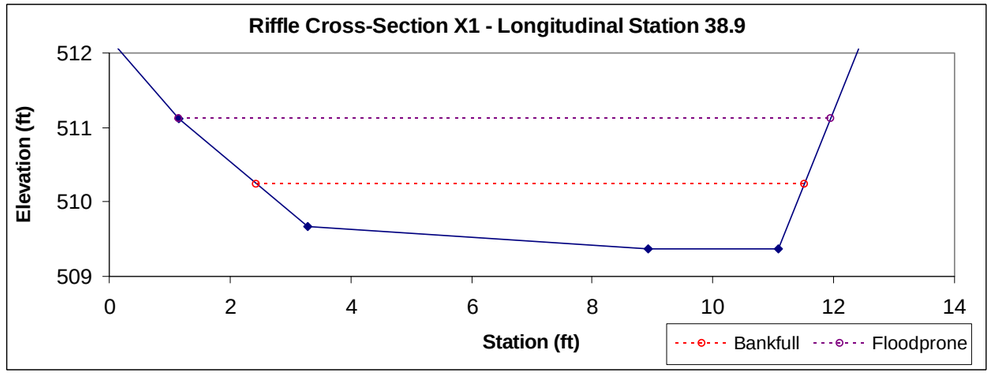
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	B3/1a	4.2	7.2	0.6	0.9	12.3	1.6	1.8	500.7	501.3



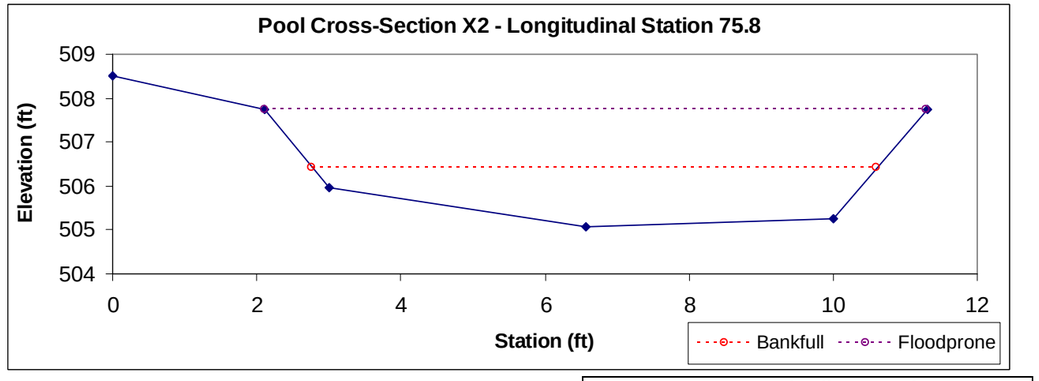
Unnamed Tributary 5 of
Pigeonroost Creek
Permanent Intermittent
(UT5PRCPI)
Profile and Cross-section Data



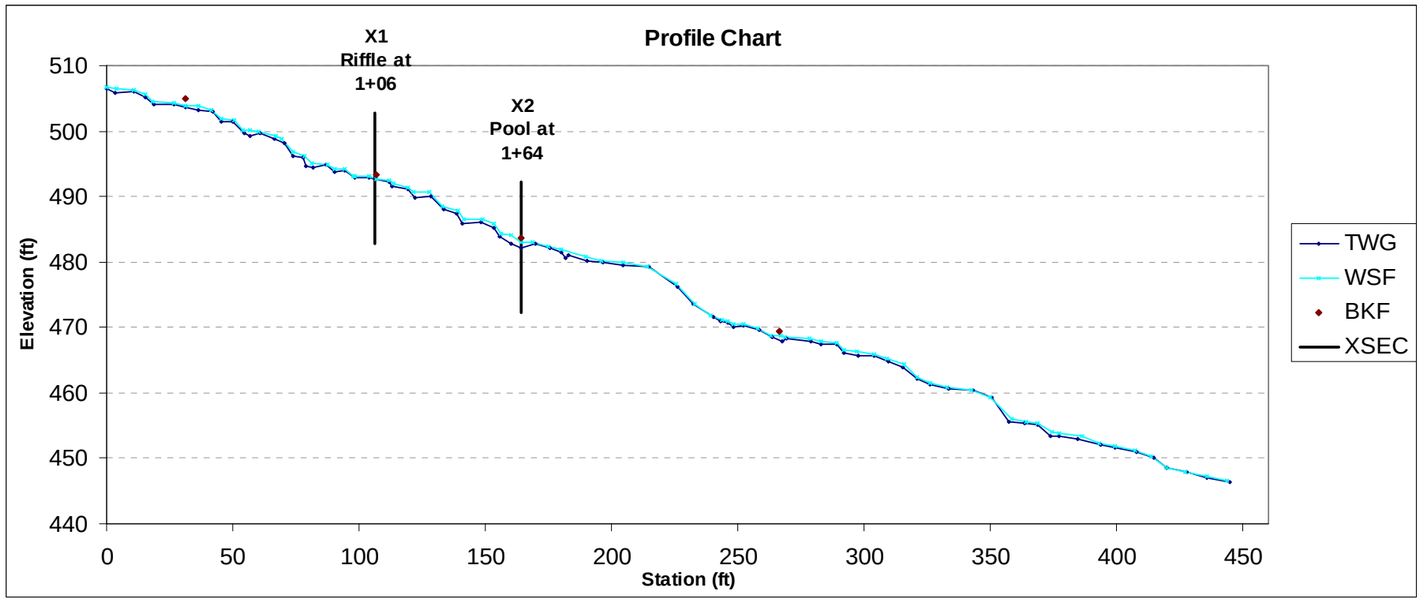
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A3/1a+	6.4	9.1	0.7	0.9	12.9	2.0	1.2	510.2	511.1



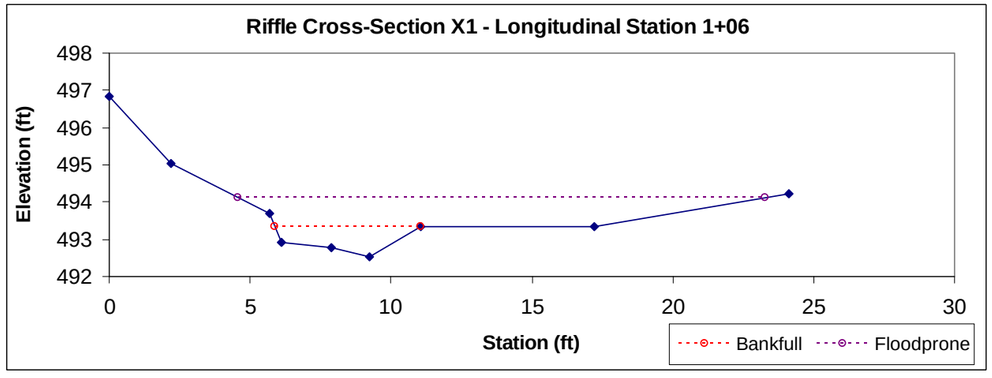
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A3/1a+	7.9	7.8	1.0	1.3	7.8	2.0	1.2	506.4	507.8



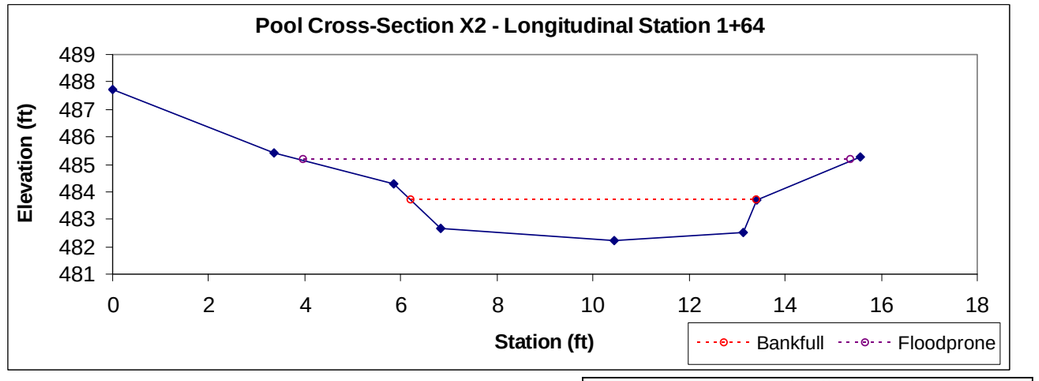
Unnamed Tributary of
Pigeon Creek
Temporary Intermittent
(UTPCTI)
Profile and Cross-section Data



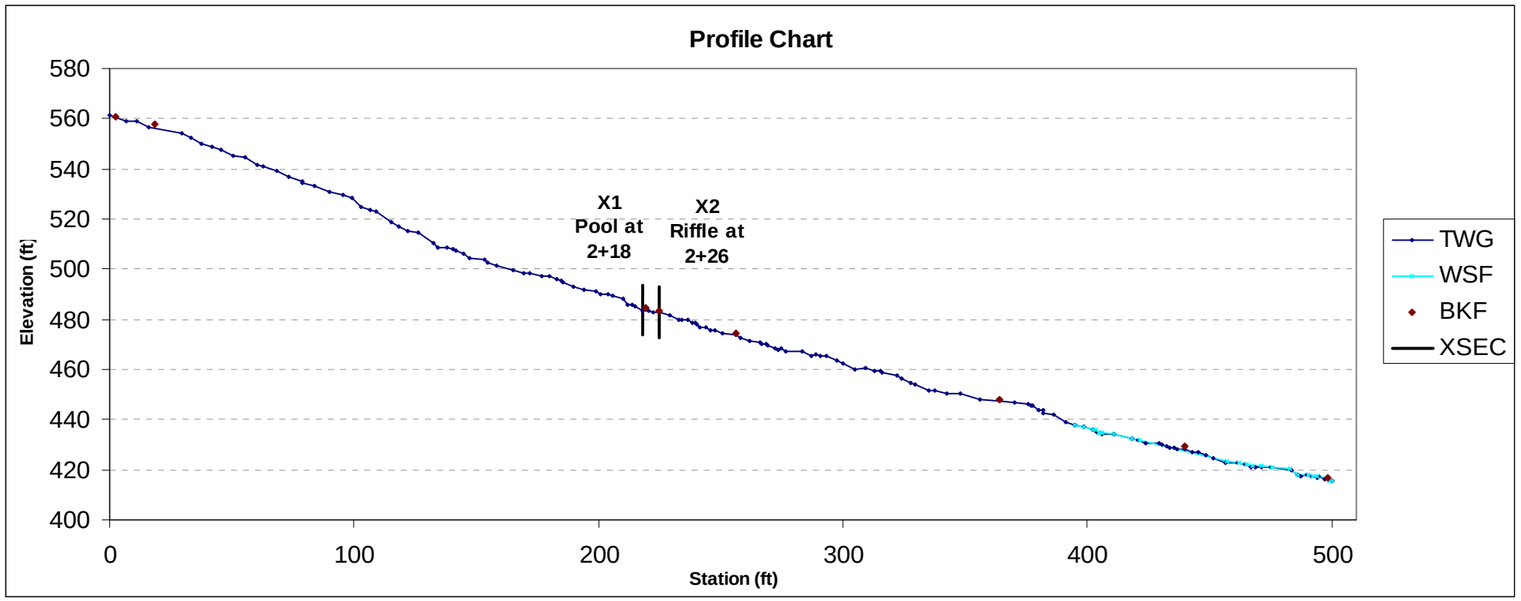
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A4/1a+	2.6	5.2	0.5	0.8	10.3	1.5	3.6	493.3	493.7



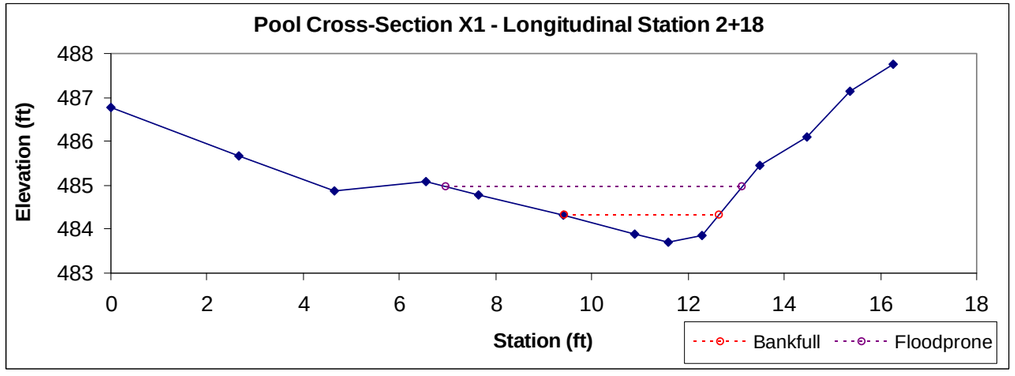
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A4/1a+	8.5	7.2	1.2	1.5	6.1	1.4	1.6	483.7	484.3



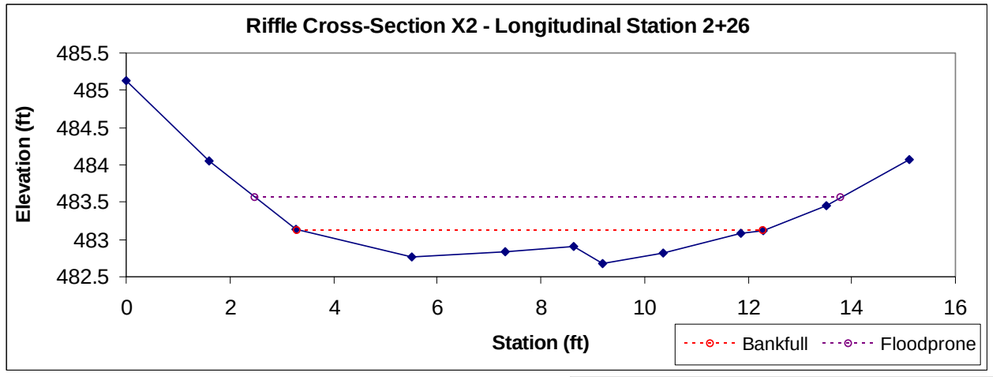
Unnamed Tributary of
Pigeon Creek
Permanent Intermittent
(UTPCPI)
Profile and Cross-section Data



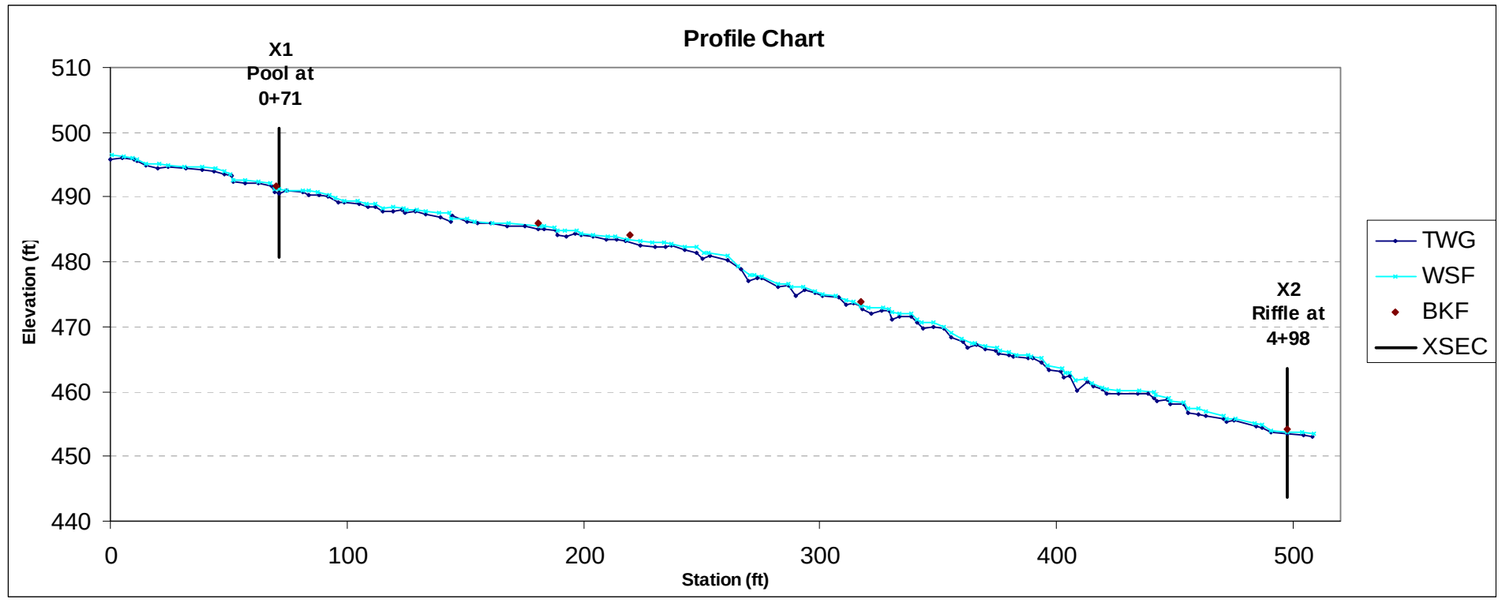
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A3a+	1.2	3.2	0.4	0.6	8.9	4.8	1.9	484.3	486.8



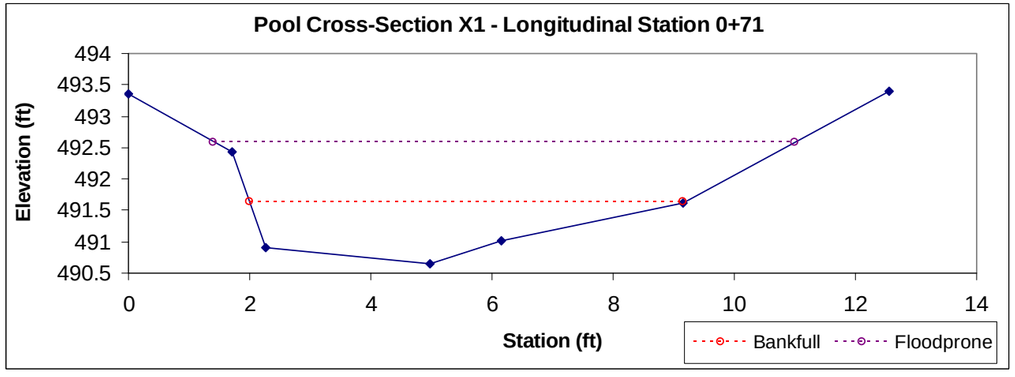
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A3a+	2.2	9.0	0.2	0.4	37.0	3.2	1.3	483.1	484.1



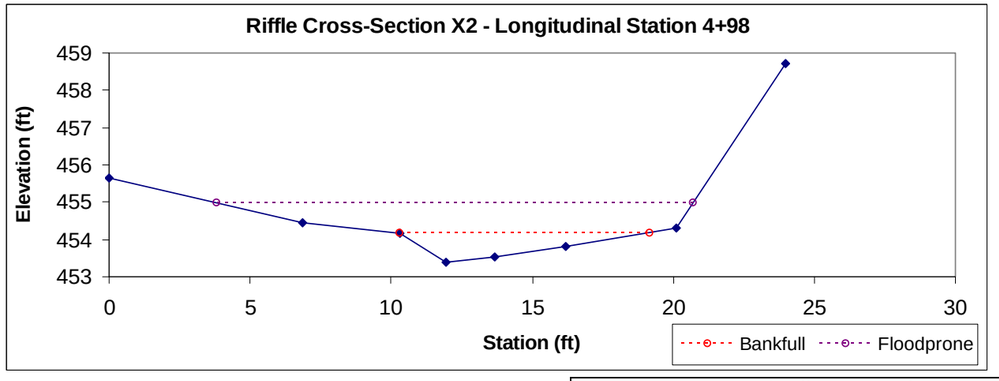
Unnamed Tributary of
Pigeon Creek
Permanent Ephemeral
(UTPCPE)
Profile and Cross-section Data



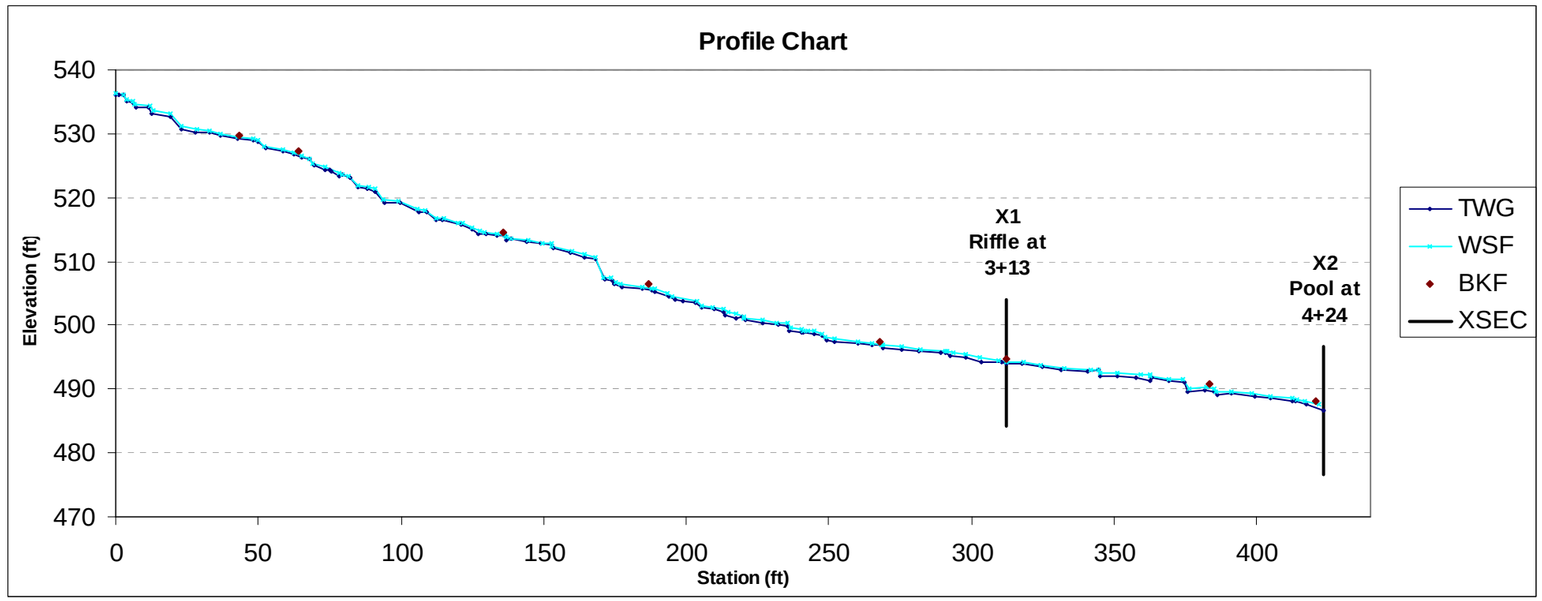
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		4.2	7.2	0.6	1.0	12.1	1.8	1.3	491.6	492.4



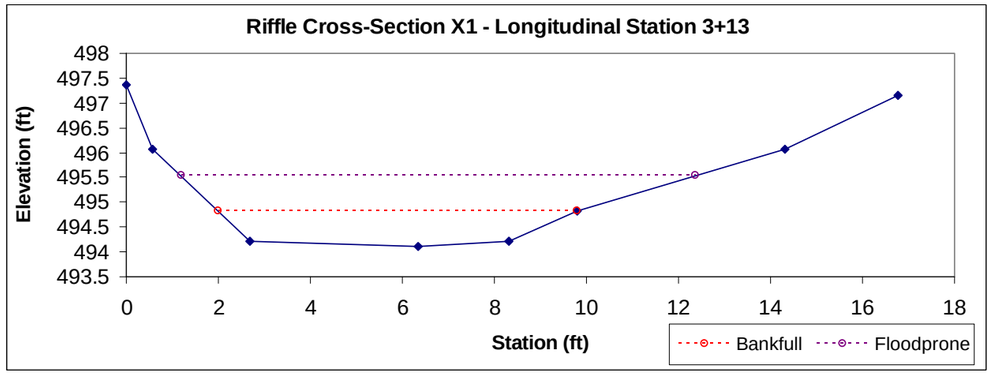
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	B3a	3.7	8.9	0.4	0.8	21.3	2.8	1.9	454.2	455.6



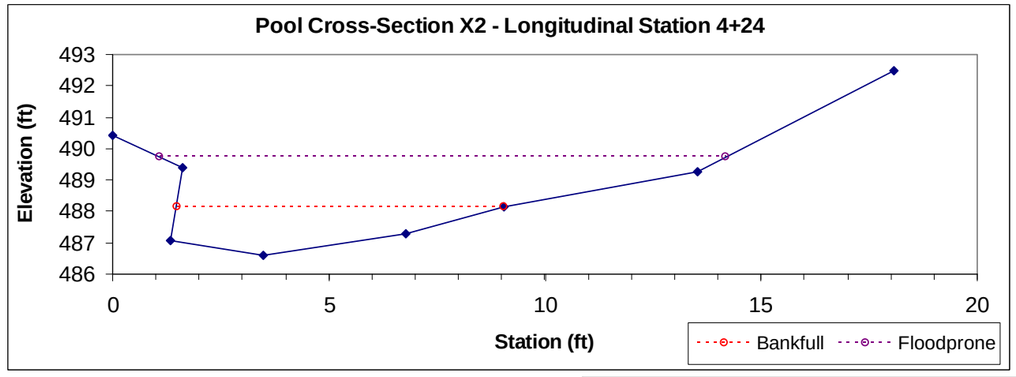
Unnamed Tributary 5 of
Miller Creek
Temporary Perennial
(UT5MCTP)
Profile and Cross-section Data



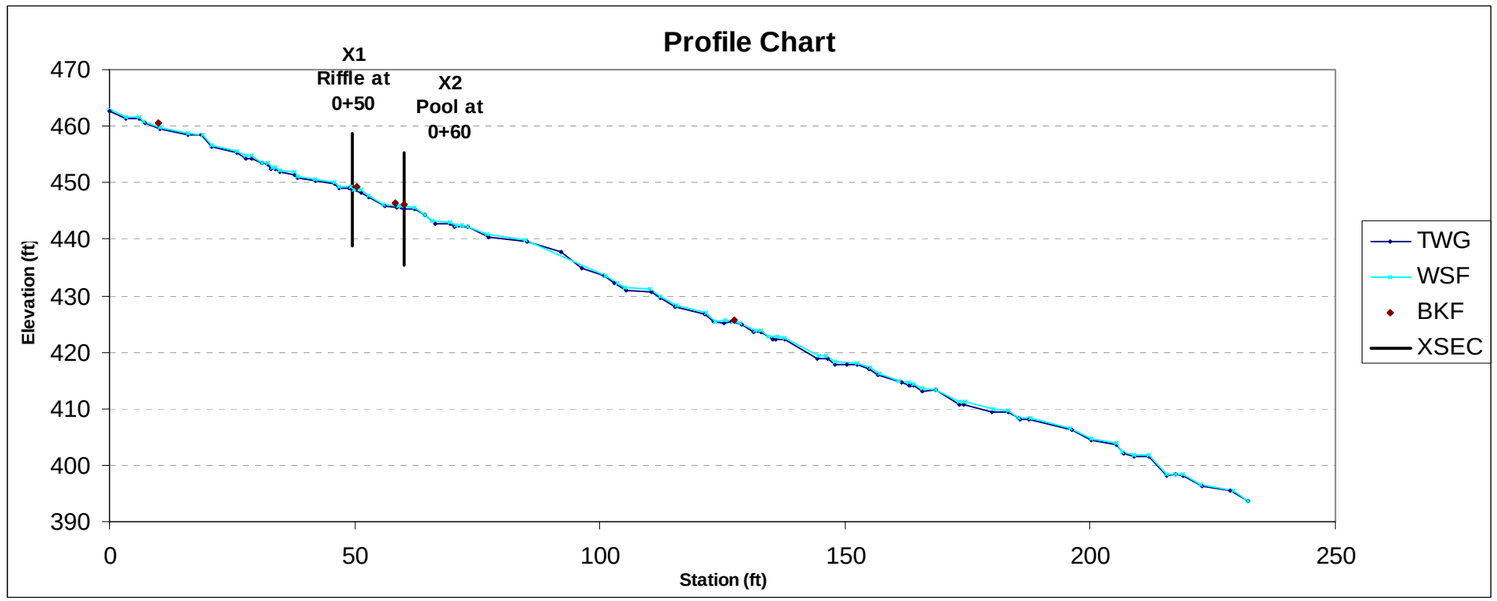
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	B4a	4.4	7.8	0.6	0.7	13.9	2.8	1.4	494.8	496.1



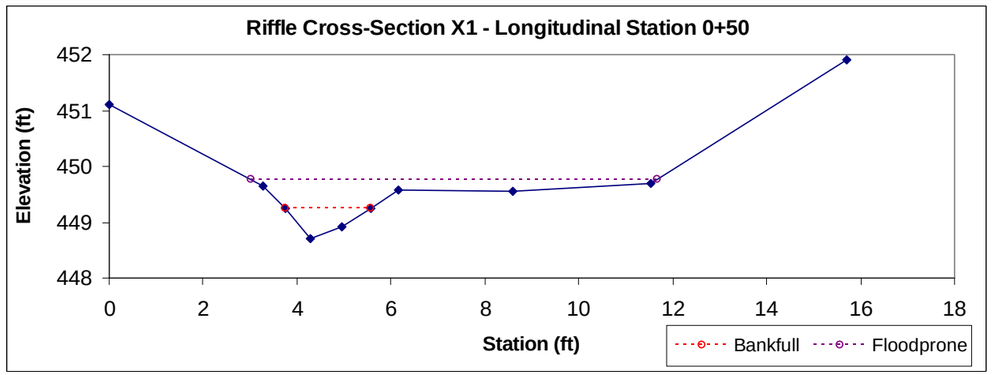
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	B4a	5.8	6.6	0.9	1.6	7.6	1.8	2.1	488.2	489.4



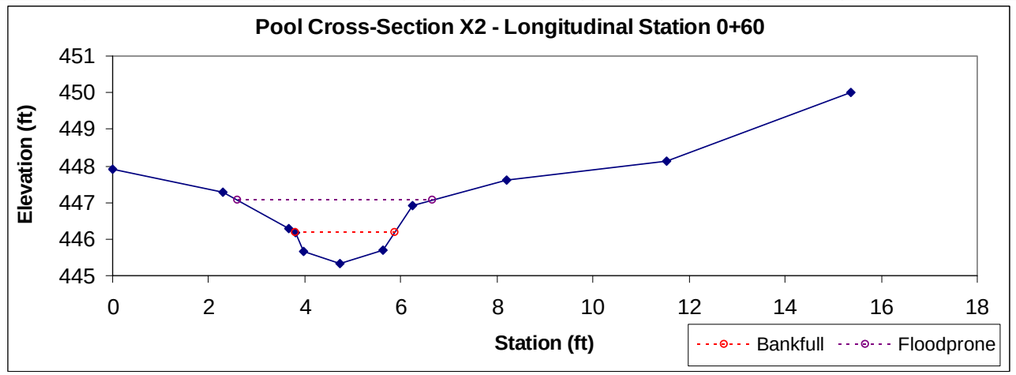
Unnamed Tributary 5 of
Miller Creek
Permanent Perennial
(UT5MCPP)
Profile and Cross-section Data



Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	A4a+	0.5	1.8	0.3	0.5	6.2	1.7	4.8	449.2	449.6



Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool	A4a+	1.3	2.1	0.6	0.9	3.4	1.1	2.0	446.2	446.3

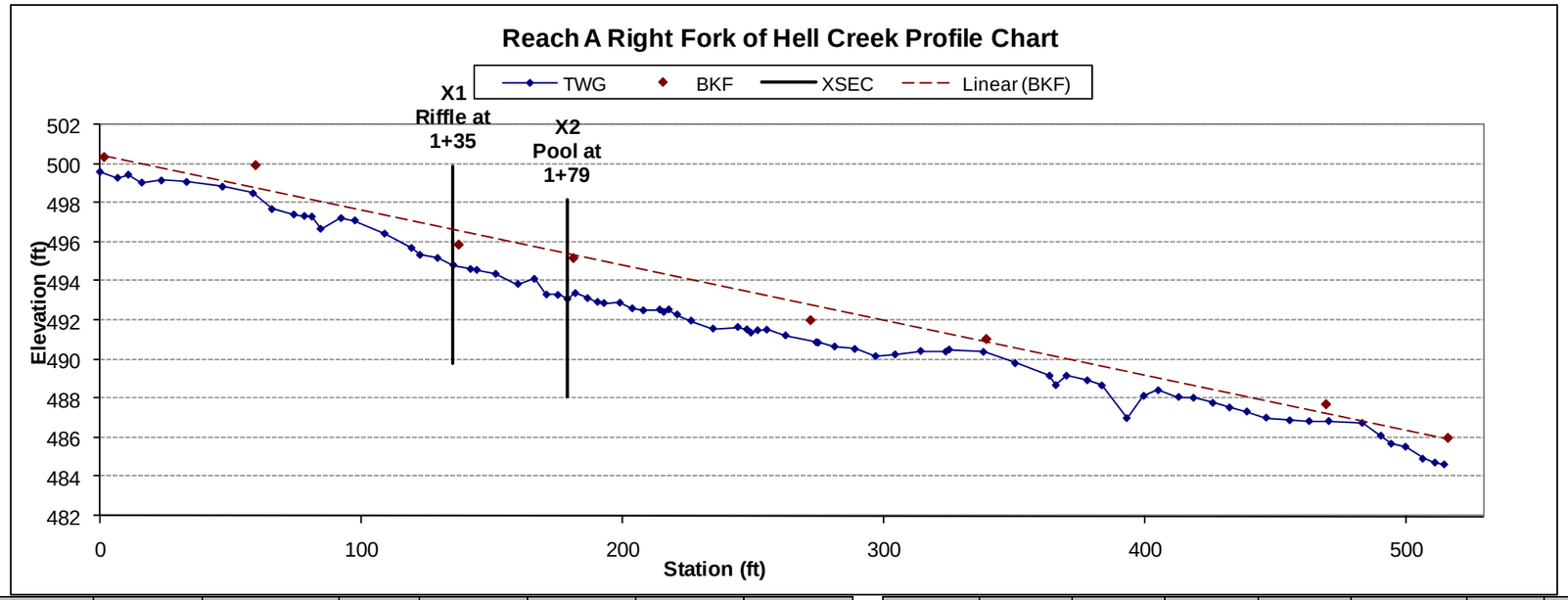


Unnamed Tributary 5 of
Miller Creek
Permanent Intermittent
(UT5MCPI)
Profile and Cross-section Data

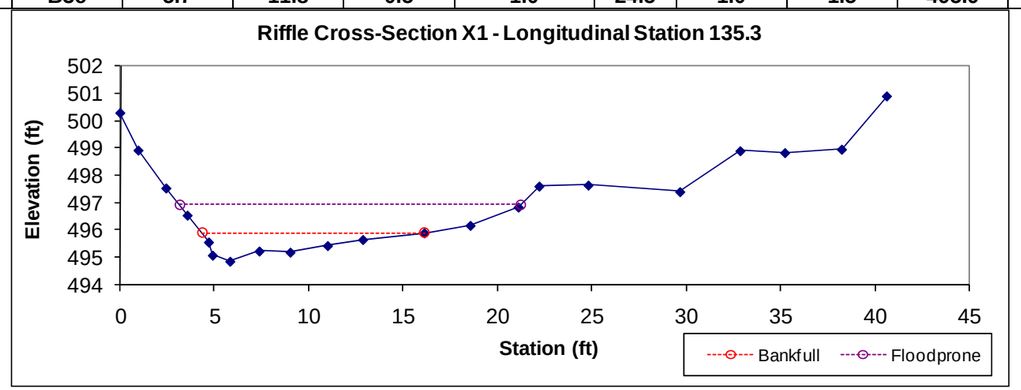
Proposed Mitigation Geomorphology
Profiles and Cross-Sections

Existing Conditions of Mitigation Reaches (October, 2008)

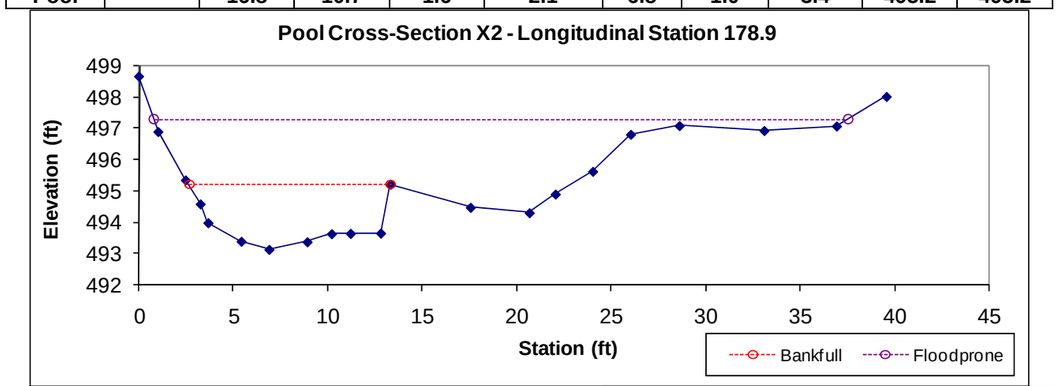
Stream Segment		Reach A	Reach B1	Reach D	Reach E
Upstream Coordinate		37° 43' 56.70" N 82° 13' 43.78" W	37° 44' 10.32" N 82° 13' 22.49" W	37° 44' 32.47" N 82° 12' 57.71" W	37° 44' 19.10" N 82° 13' 0.46" W
Downstream Coordinate		37° 44' 0.63" N 82° 13' 40.59" W	37° 44' 13.82" N 82° 13' 19.27" W	37° 44' 37.63" N 82° 12' 56.51" W	37° 44' 23.80" N 82° 13' 2.11" W
Rosgen Stream Type		B3c	B3c	B4c	B4c
Drainage Area (sq mi)		0.59	1.19	3.5	1.9
Reach Length Surveyed (ft)		514.4	588.8	506.0	493.4
Dimension	Bankfull Width (ft)	11.8	19.2	10.4	16.1
	Bankfull Mean Depth (ft)	0.5	1.3	1.1	1.0
	Width/Depth Ratio	24.5	14.4	9.6	15.7
	Bankfull Area (sq ft)	5.7	25.7	11.2	16.5
	Bankfull Max Depth (ft)	1.0	2.1	1.3	1.6
	Width of Floodprone Area (ft)	18.1	26.1	16.8	18.4
	Entrenchment Ratio	1.5	1.4	1.6	1.1
	Max Pool Depth (ft)	2.1	2.2	2.5	2.0
	Ratio of Max Pool Depth to Bankfull Depth	4.3	1.6	2.4	2.0
	Pool Width (ft)	10.7	16.0	13.1	17.8
	Ratio of Pool Width to Bankfull Width	0.9	0.8	1.3	1.1
	Pool to Pool Spacing (ft)	61.7	28.7	356.6	24.1
	Ratio of Pool to Pool Spacing to Bankfull Width	5.2	1.5	34.4	1.5
	Bank Height Ratio	1.0	1.5	3.0	2.4
Pattern	Meander Length (ft)	----	----	----	----
	Meander Length Ratio	----	----	----	----
	Radius of Curvature (ft)	----	----	----	----
	Radius of Curvature Ratio	----	----	----	----
	Meander Belt Width (ft)	----	----	----	----
	Meander Width Ratio	----	----	----	----
	Sinuosity	1.10	1.12	1.12	1.05
Profile	Valley Slope (ft/ft)	0.0280	0.0198	0.030	0.0235
	WS Slope (ft/ft)	NA	NA	NA	NA
	Channel Slope (ft/ft)	0.0291	0.0235	0.021	0.0233
	Pool Slope (ft/ft)	NA	NA	NA	NA
	Ratio of Pool Slope to WS Slope	NA	NA	NA	NA



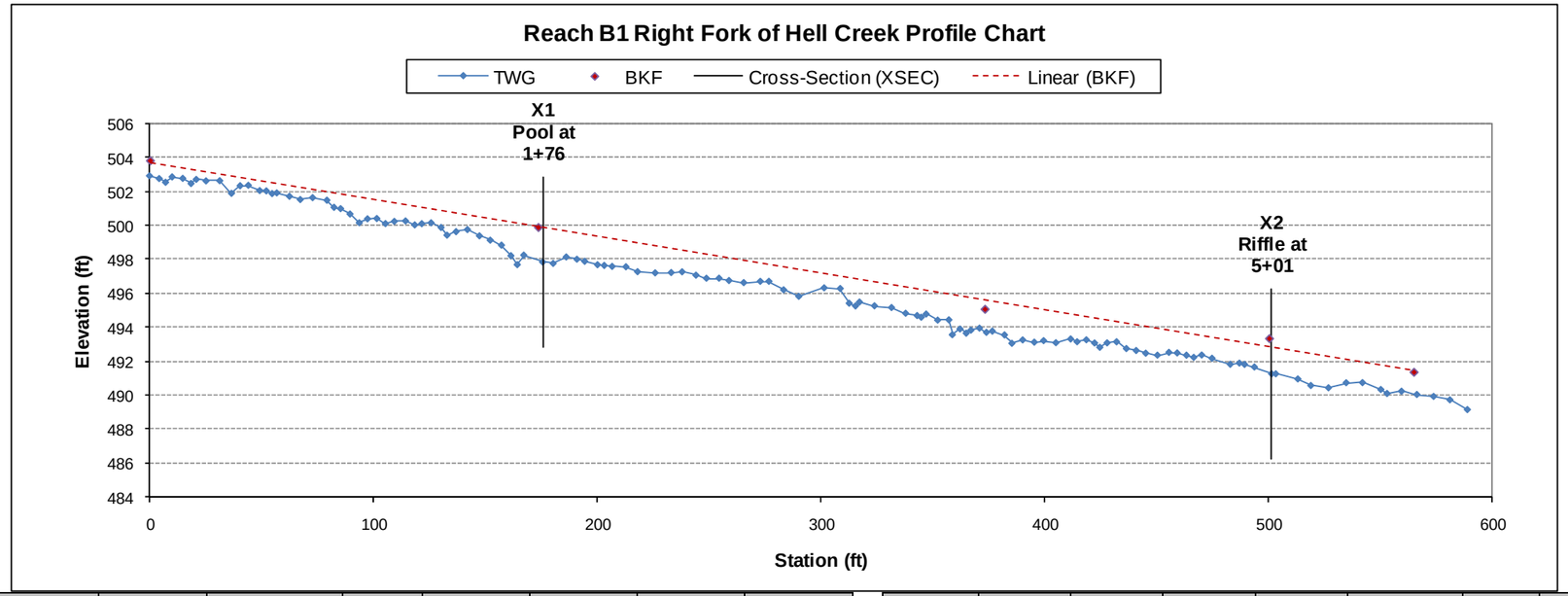
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	B3c	5.7	11.8	0.5	1.0	24.5	1.0	1.5	495.9	495.9



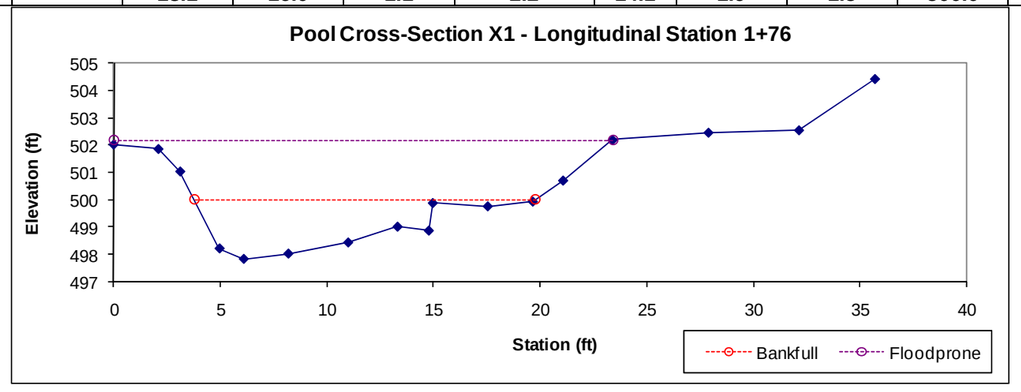
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		16.8	10.7	1.6	2.1	6.8	1.0	3.4	495.2	495.2



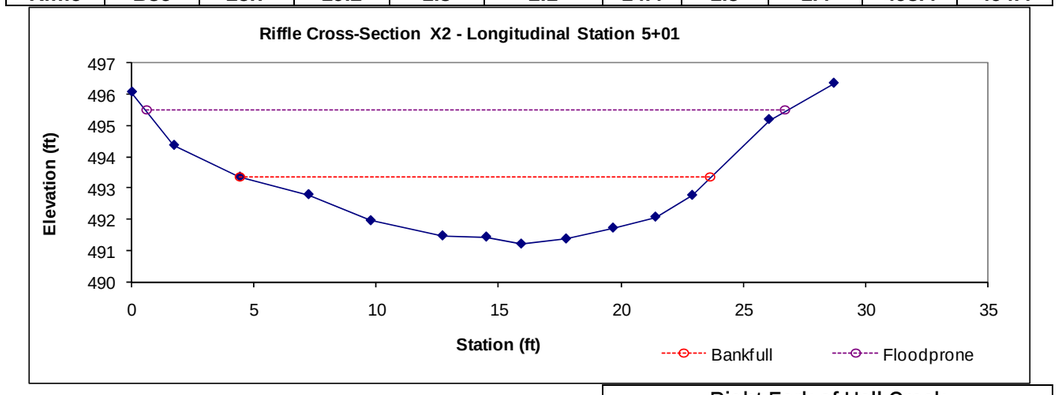
Right Fork of Hell Creek
Reach A
Profile and Cross-section Data



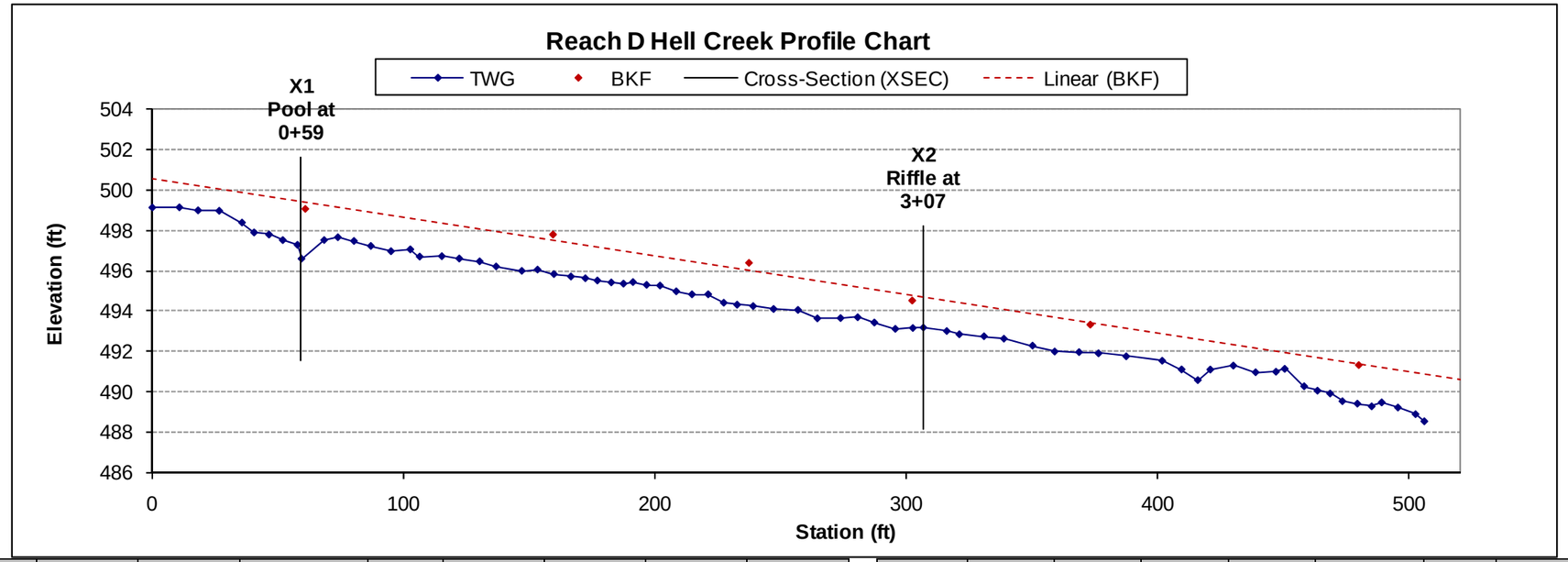
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		18.1	16.0	1.1	2.2	14.1	1.9	1.5	500.0	502.0



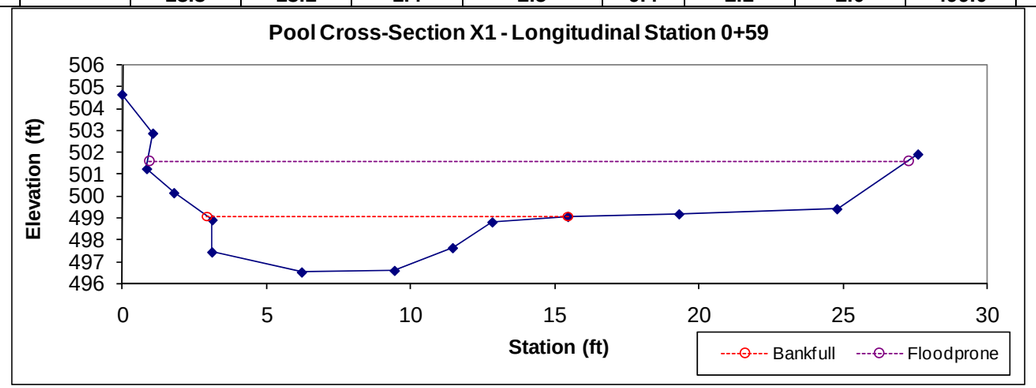
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	B3c	25.7	19.2	1.3	2.1	14.4	1.5	1.4	493.4	494.4



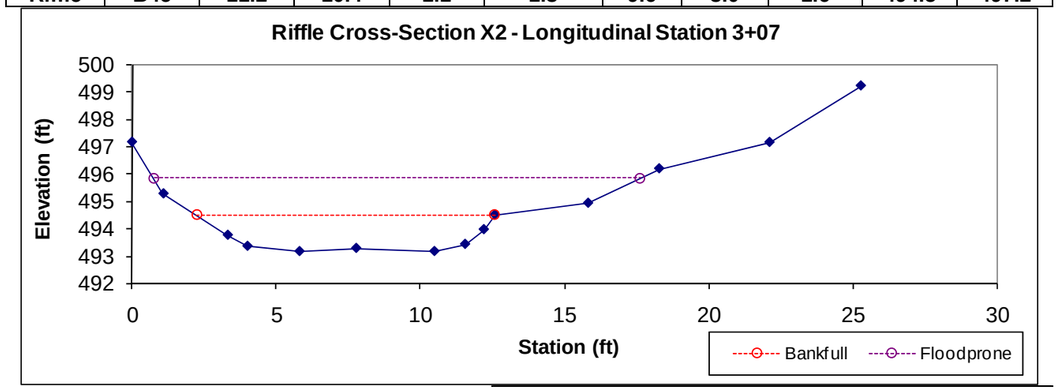
Right Fork of Hell Creek
Reach B1
Profile and Cross-section Data



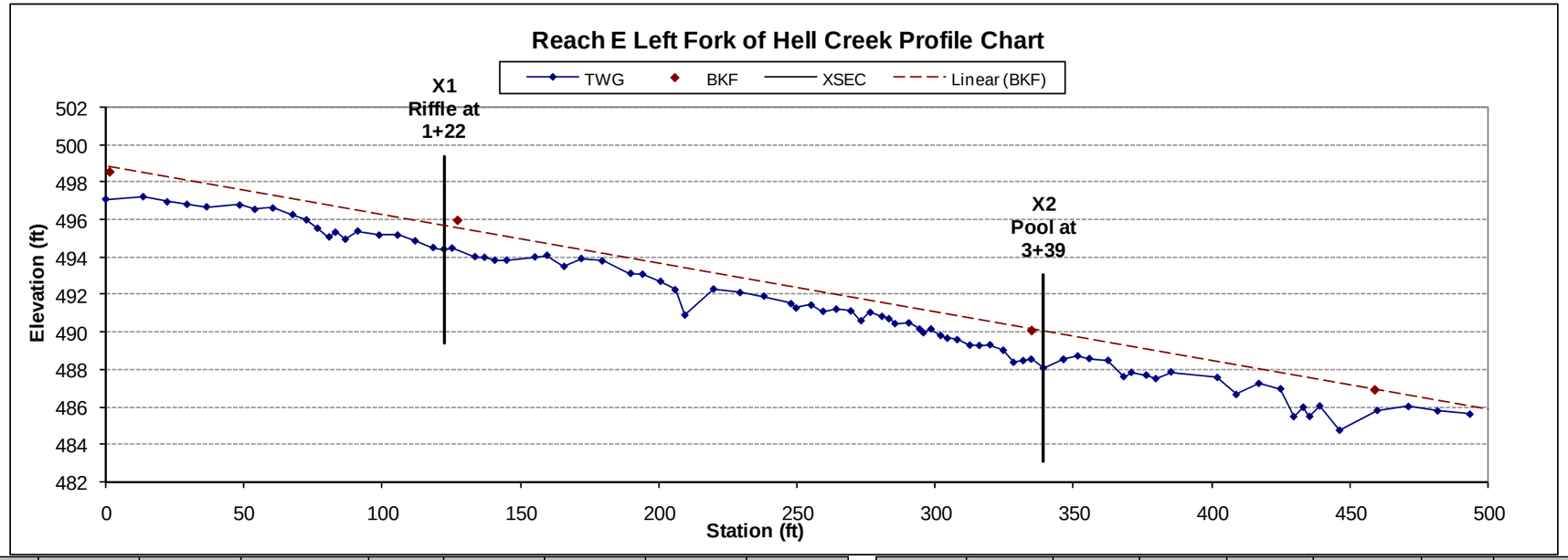
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		18.3	13.1	1.4	2.5	9.4	2.1	2.0	499.0	501.9



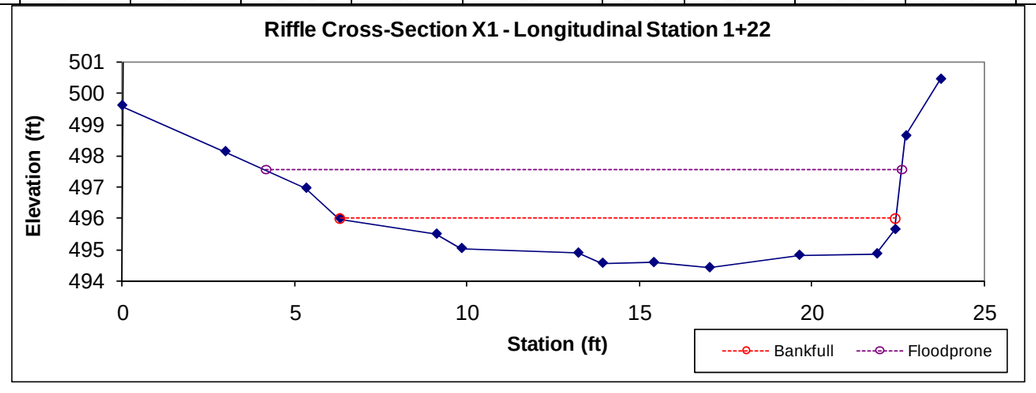
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	B4c	11.2	10.4	1.1	1.3	9.6	3.0	1.6	494.5	497.2



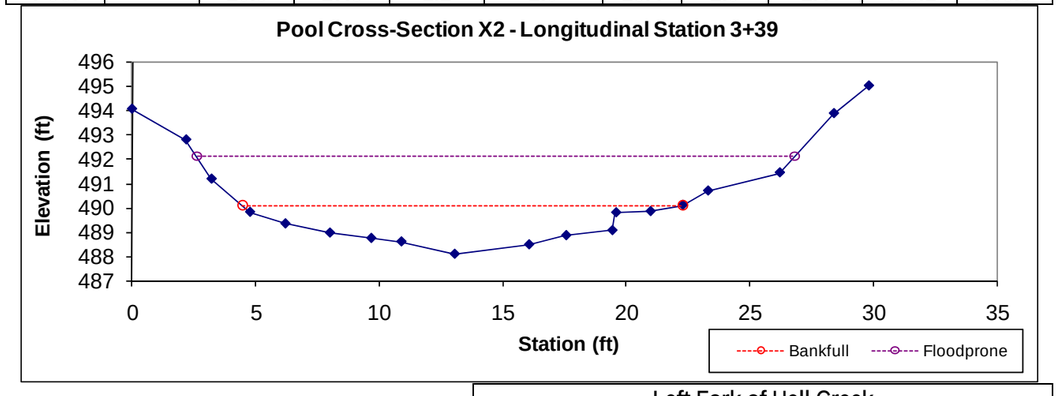
Hell Creek
Reach D
Profile and Cross-section Data



Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	B3c	16.5	16.1	1.0	1.6	15.7	2.4	1.1	495.9	498.1



Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		20.5	17.8	1.2	2.0	15.4	2.9	1.4	490.1	493.9

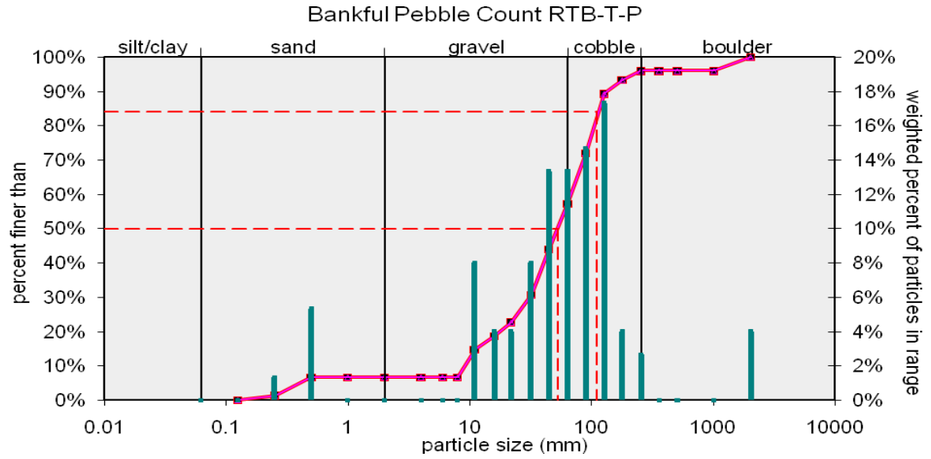


Left Fork of Hell Creek
Reach E
Profile and Cross-section Data

Impact Site Pebble Counts

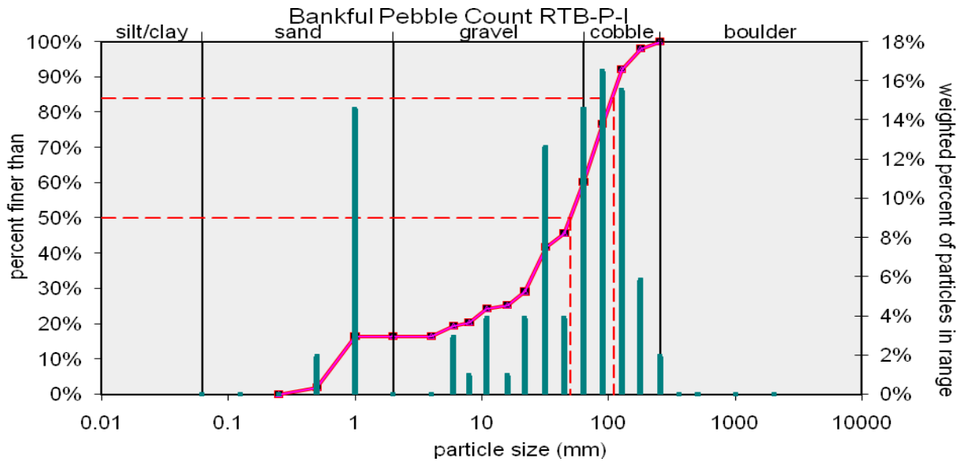
D16	D35	D50	D84	D95
12	36	53	110	220

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
0	5	39	30	3	23



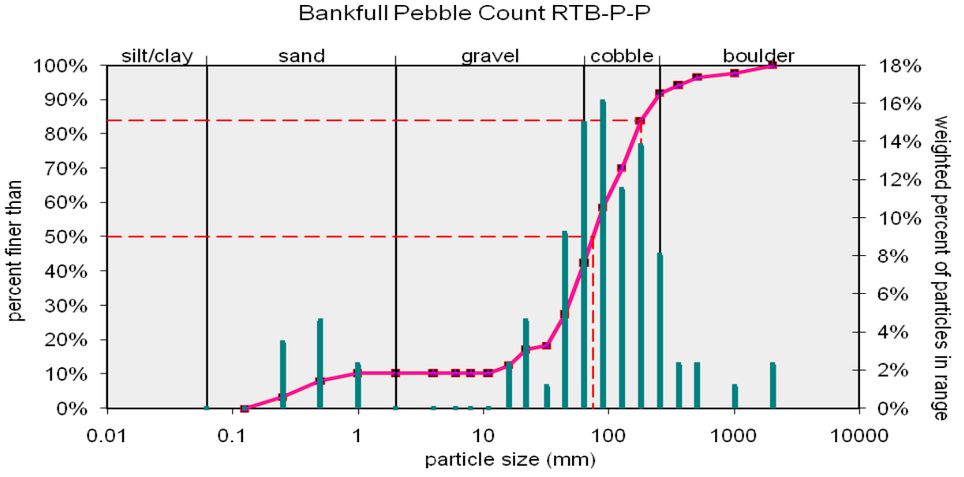
D16	D35	D50	D84	D95
0.98	26	50	110	150

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
0	17	44	40	0	0



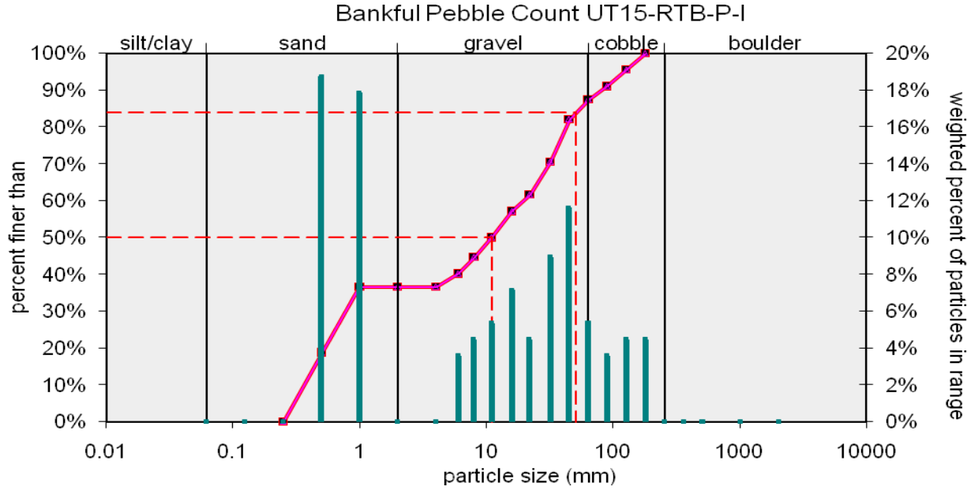
D16	D35	D50	D84	D95
20	54	75	180	410

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
0	9	28	43	7	12



D16	D35	D50	D84	D95
0.45	0.94	11	51	120

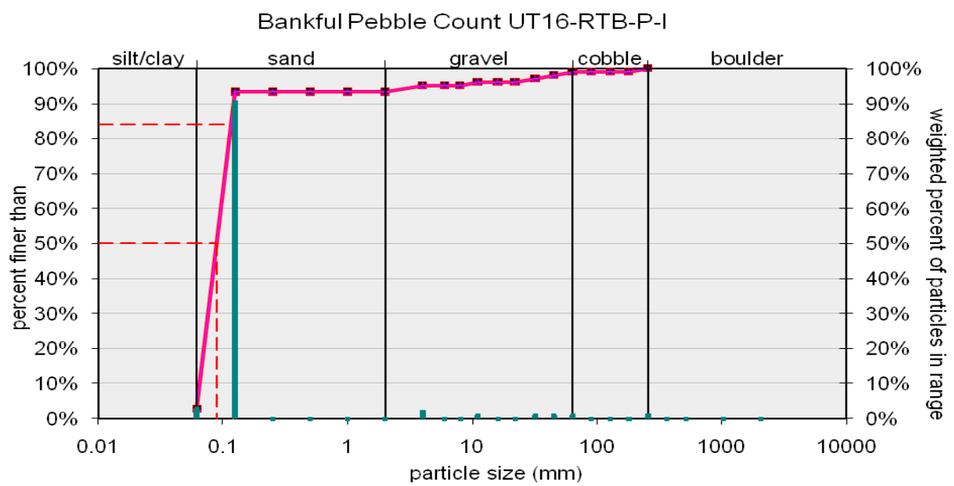
Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
0	37	51	13	0	0



Substrate Characterization

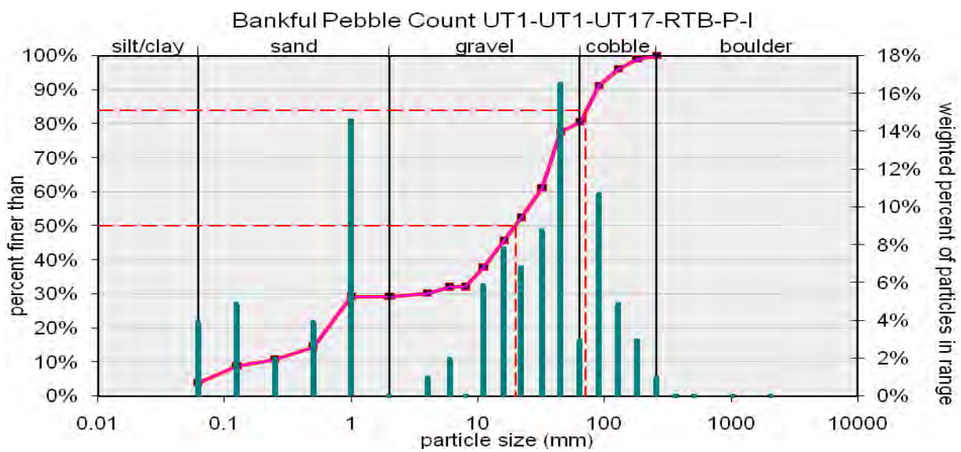
D16	D35	D50	D84	D95
.069	.08	.089	.12	3.7

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
3	50	6	1	0	0



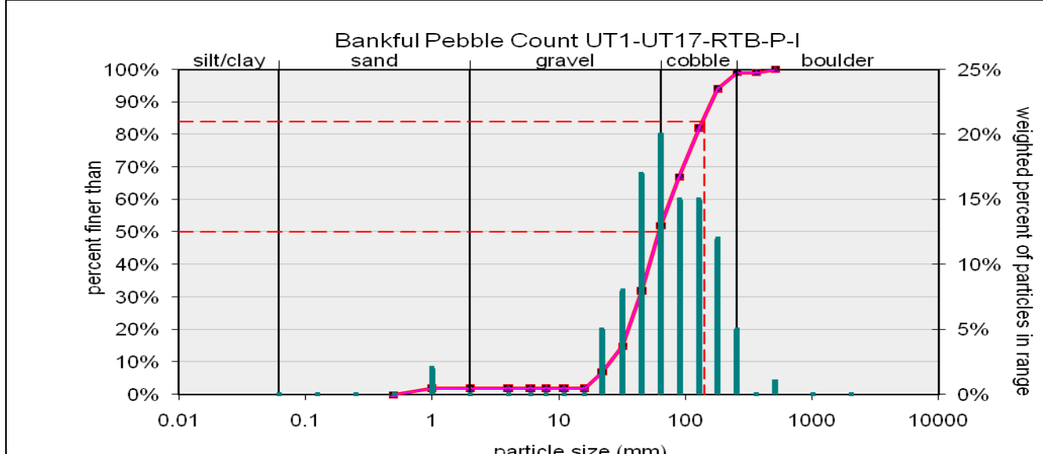
D16	D35	D50	D84	D95
.54	9.4	20	71	120

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
4	25	51	19	0	0



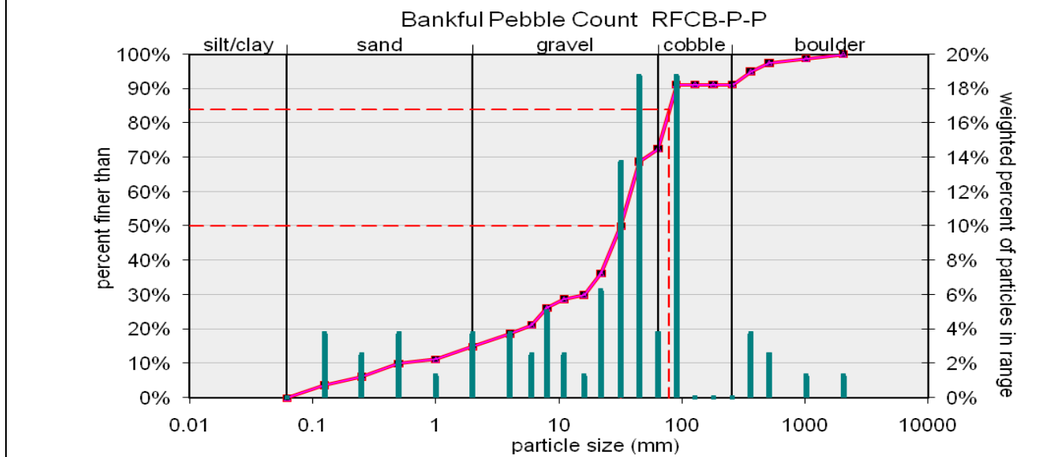
D16	D35	D50	D84	D95
33	47	62	140	190

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
0	2	50	47	1	0



D16	D35	D50	D84	D95
2.4	21	32	79	360

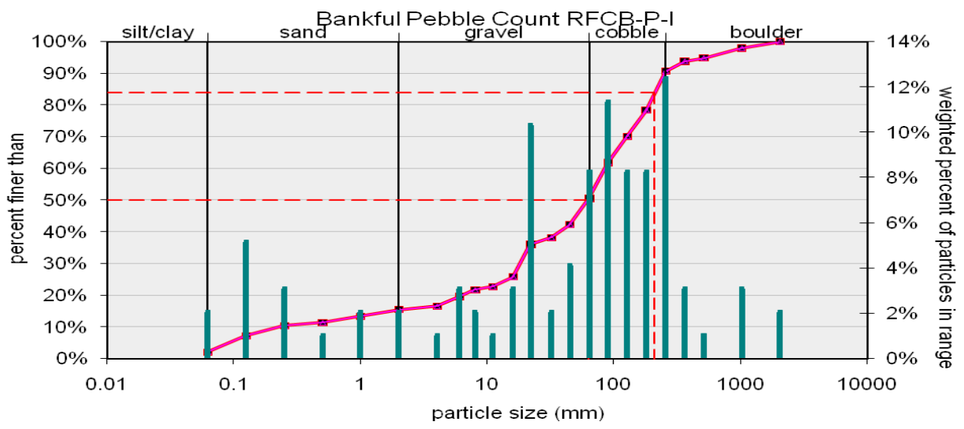
Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
0	12	47	15	7	18



Substrate Characterization

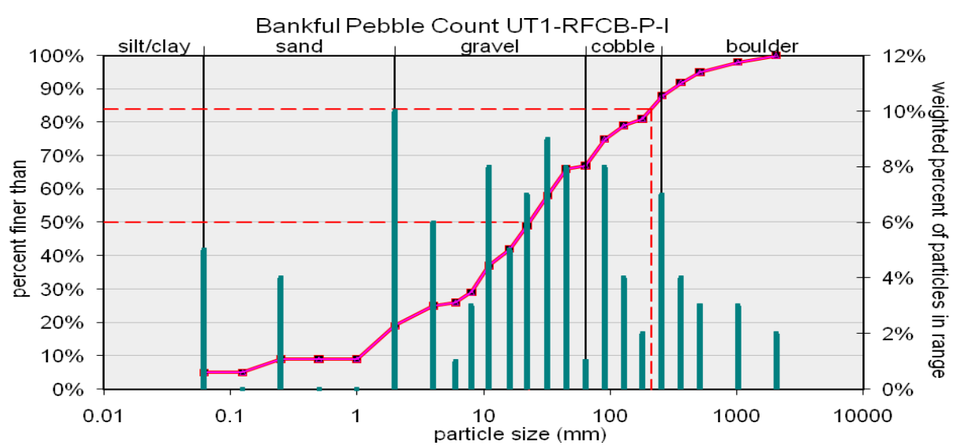
D16	D35	D50	D84	D95
2.9	21	63	210	530

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
2	13	34	39	9	3



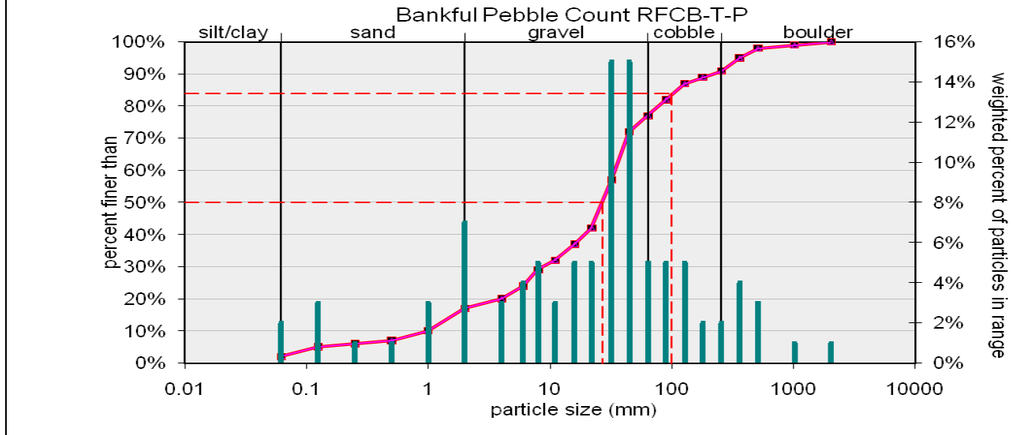
D16	D35	D50	D84	D95
1.6	10	23	210	510

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
5	14	48	21	12	0



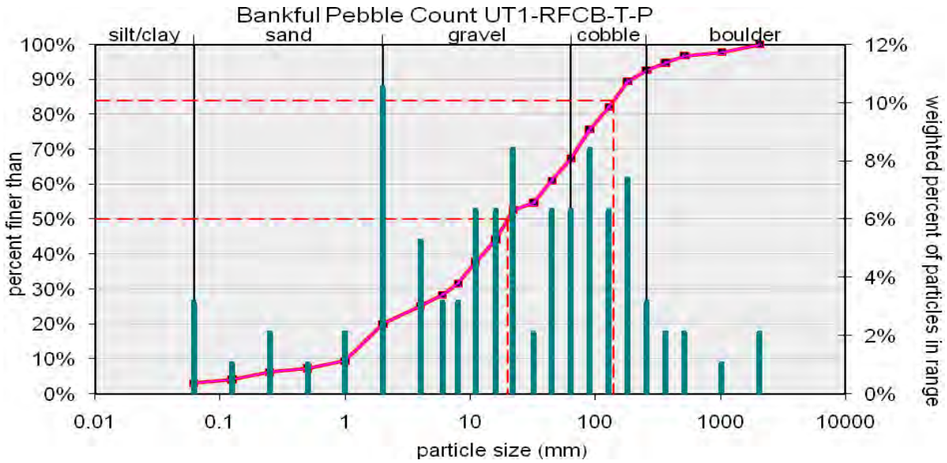
D16	D35	D50	D84	D95
1.8	14	27	100	360

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
2	15	60	14	9	0



D16	D35	D50	D84	D95
1.5	9.5	20	140	380

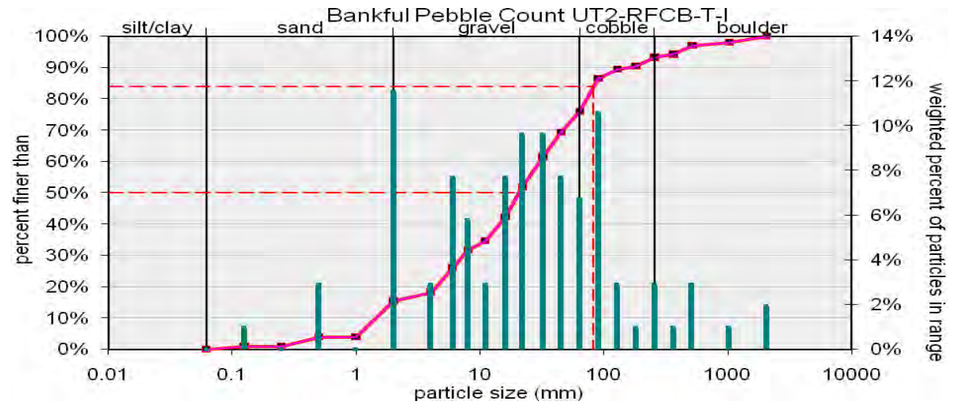
Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
3	15	42	23	7	11



Substrate Characterization

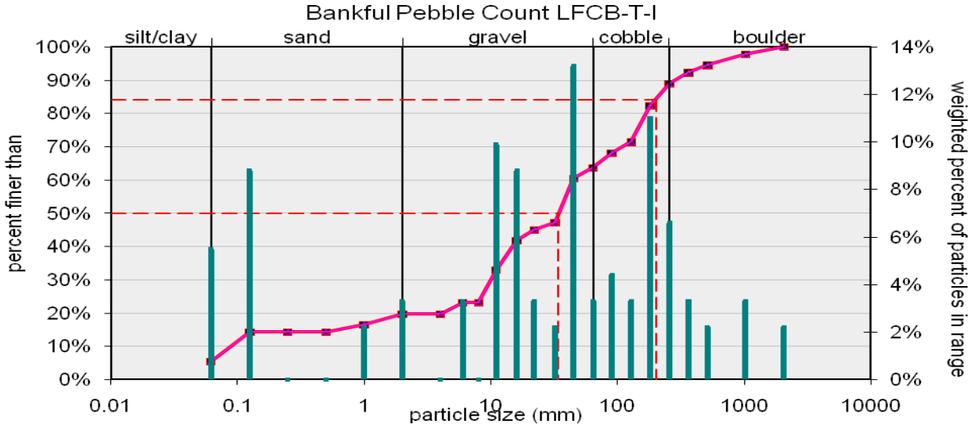
D16	D35	D50	D84	D95
2.3	11	21	83	400

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
0	15	61	17	7	0



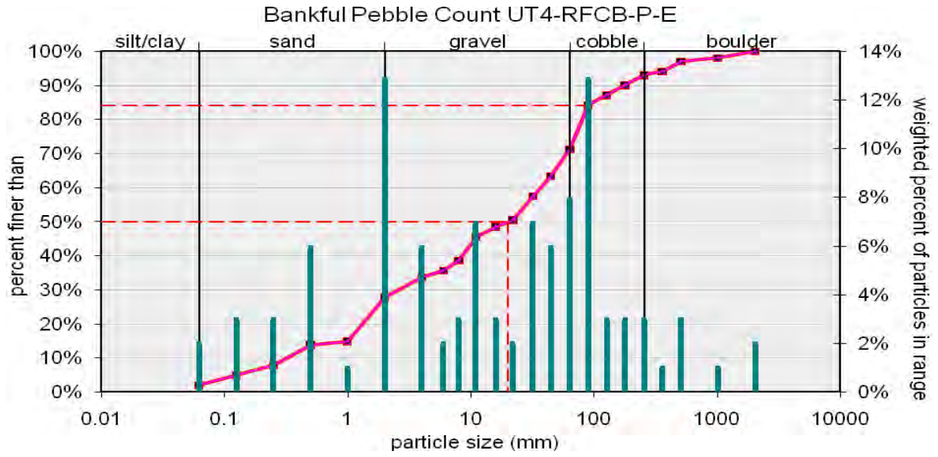
D16	D35	D50	D84	D95
0.86	12	34	200	570

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
5	13	40	23	10	8



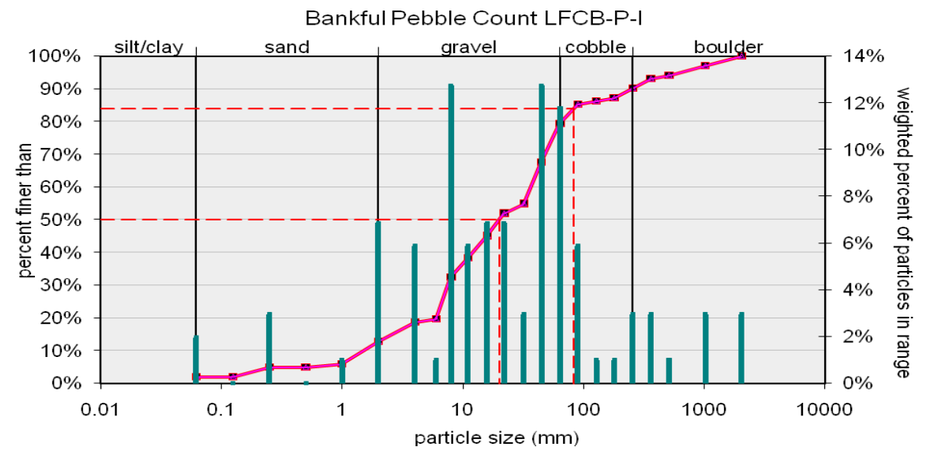
D16	D35	D50	D84	D95
1.1	5.3	20	90	400

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
2	26	44	22	7	0



D16	D35	D50	D84	D95
2.9	9.2	20	83	630

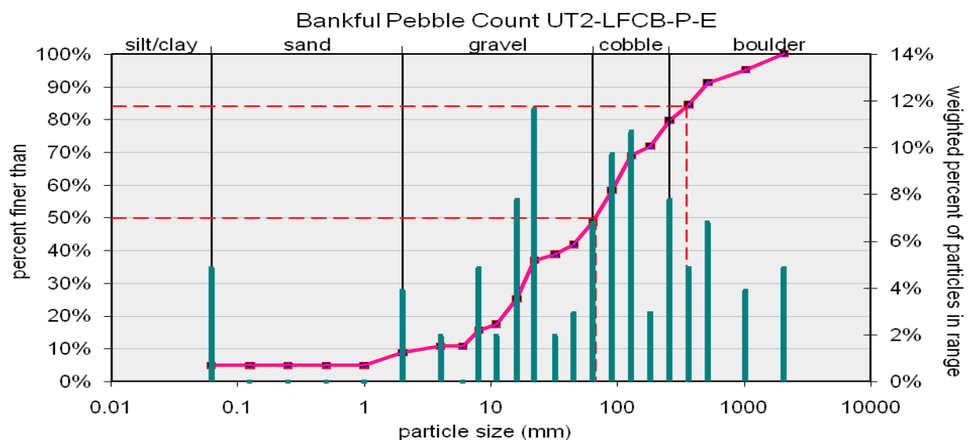
Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
2	10	63	10	9	6



Substrate Characterization

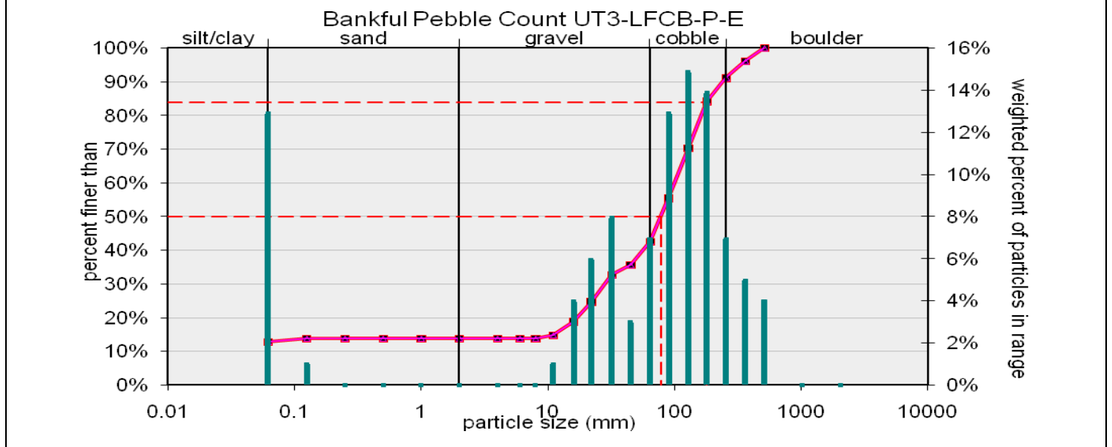
D16	D35	D50	D84	D95
8.6	21	67	350	1000

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
5	4	40	31	20	0



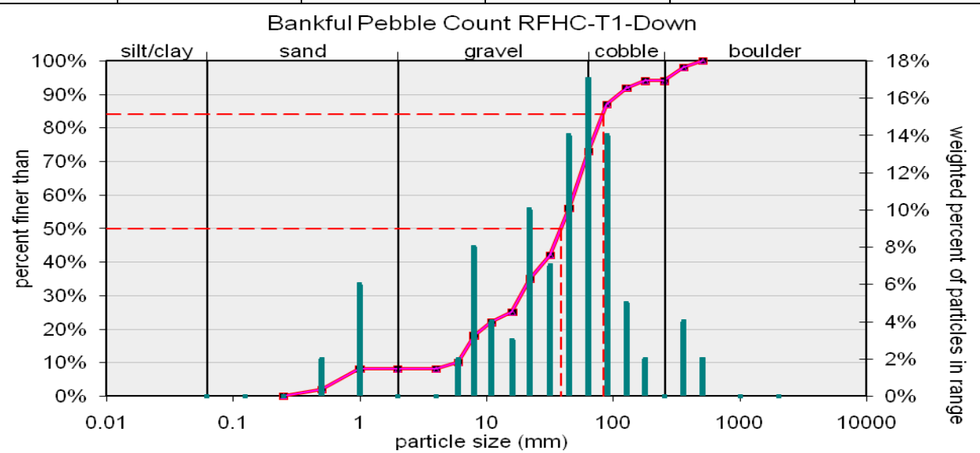
D16	D35	D50	D84	D95
12	42	78	180	340

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
13	1	29	49	9	



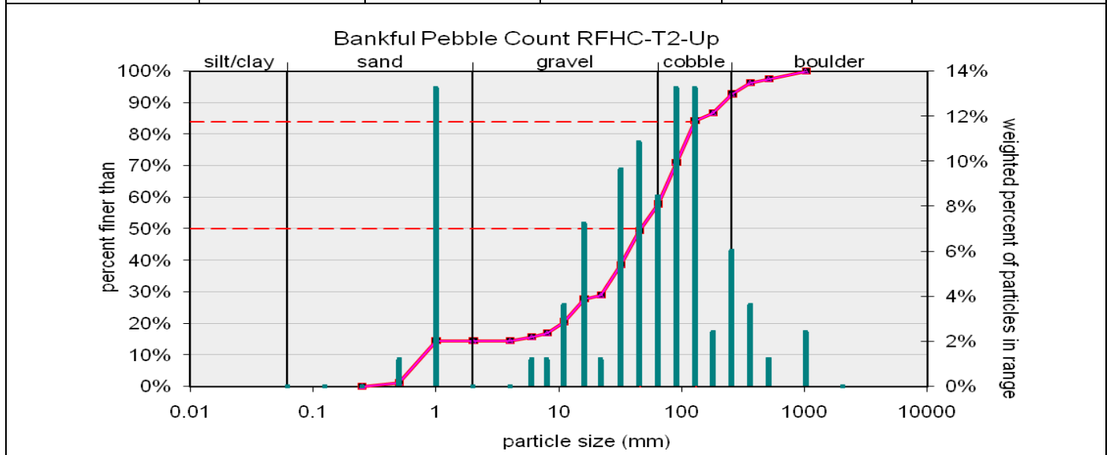
D16	D35	D50	D84	D95
7.4	22	39	84	280

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
0	8	65	21	6	0



D16	D35	D50	D84	D95
6.5	28	46	130	320

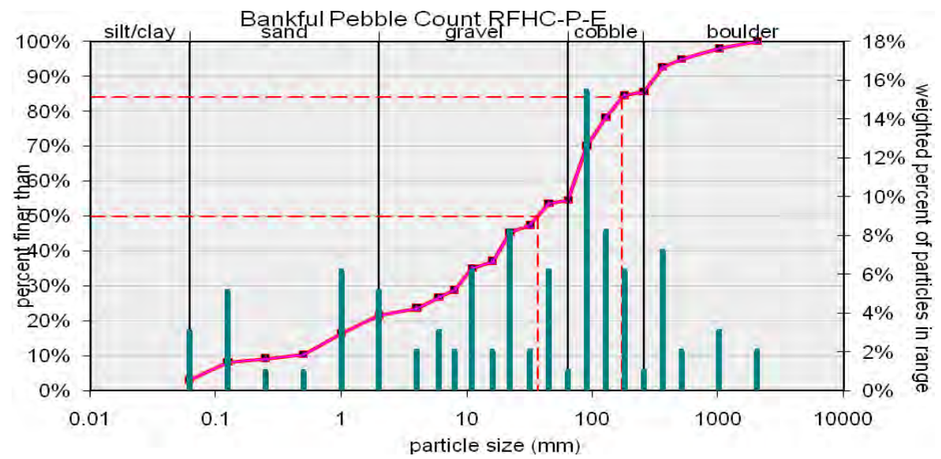
Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
0	12	37	29	6	16



Substrate Characterization

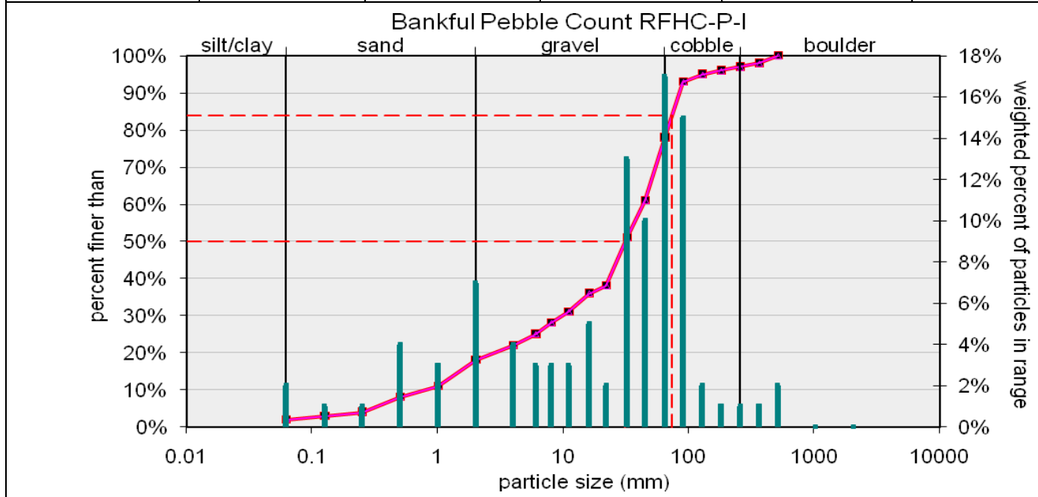
D16	D35	D50	D84	D95
0.95	11	37	170	530

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
3	18	32	30	14	3



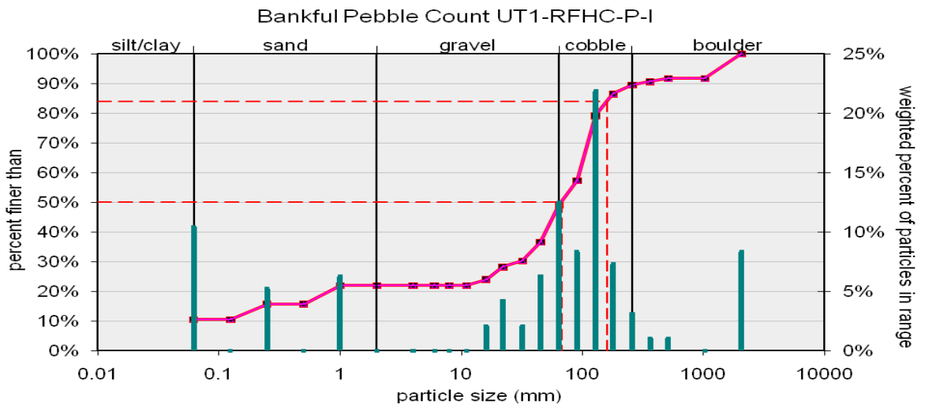
D16	D35	D50	D84	D95
1.6	15	31	73	130

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
2	15	58	18	3	4



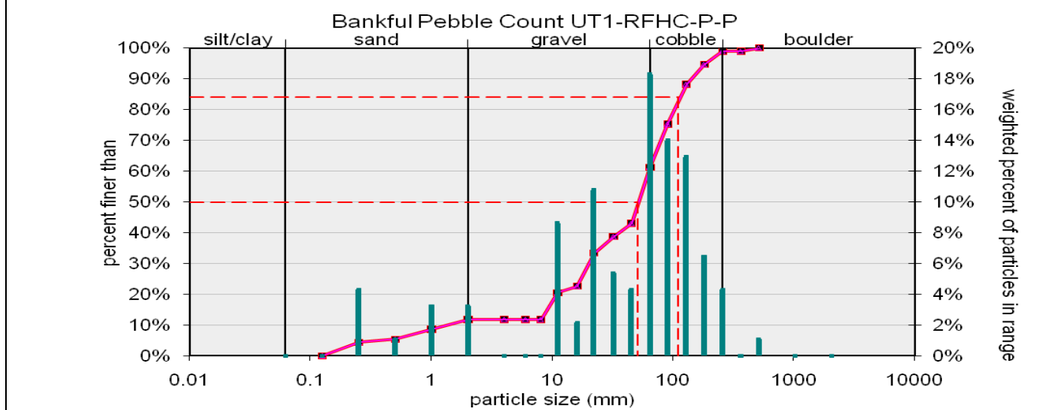
D16	D35	D50	D84	D95
0.52	42	67	160	1400

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
10	11	26	39	10	4



D16	D35	D50	D84	D95
9.3	25	51	110	190

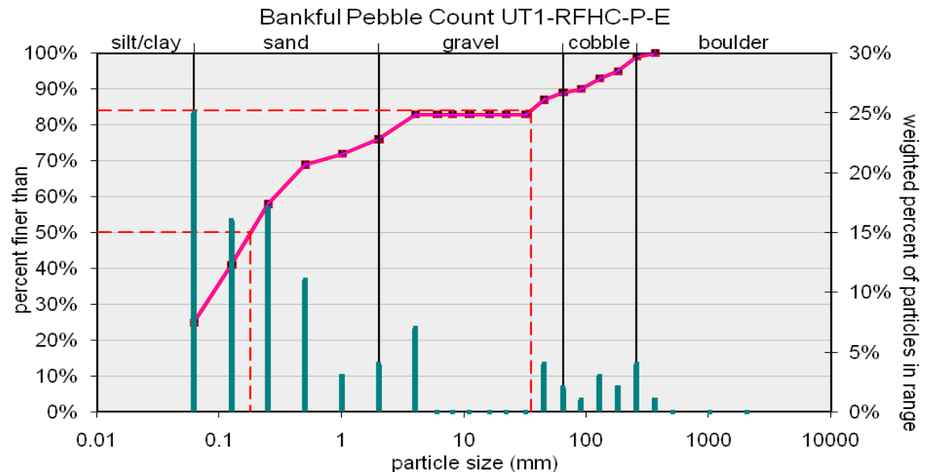
Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
0	11	45	35	1	8



Substrate Characterization

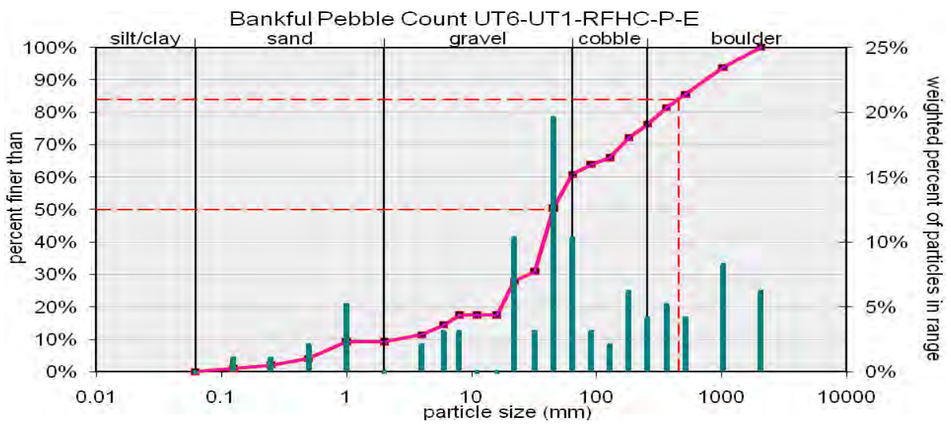
D16	D35	D50	D84	D95
0.062	0.096	0.18	35	180

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
25	51	13	10	1	0



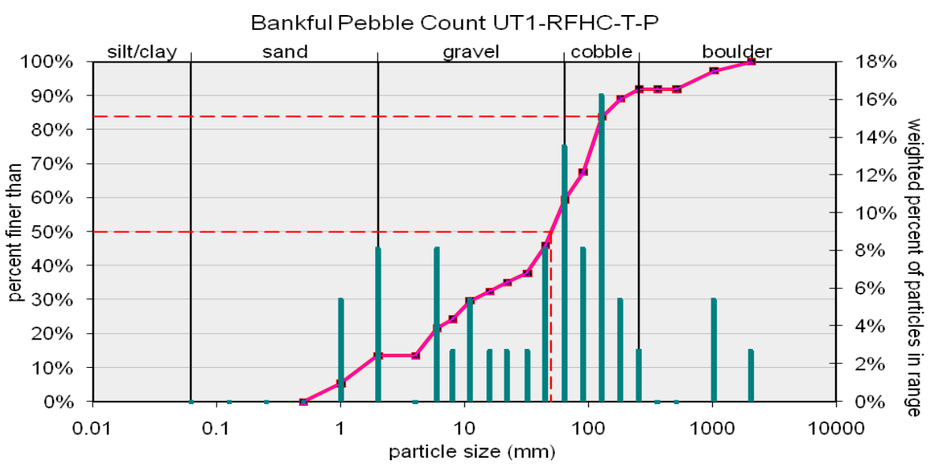
D16	D35	D50	D84	D95
6.9	34	45	450	1200

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
0	9	49	15	23	5



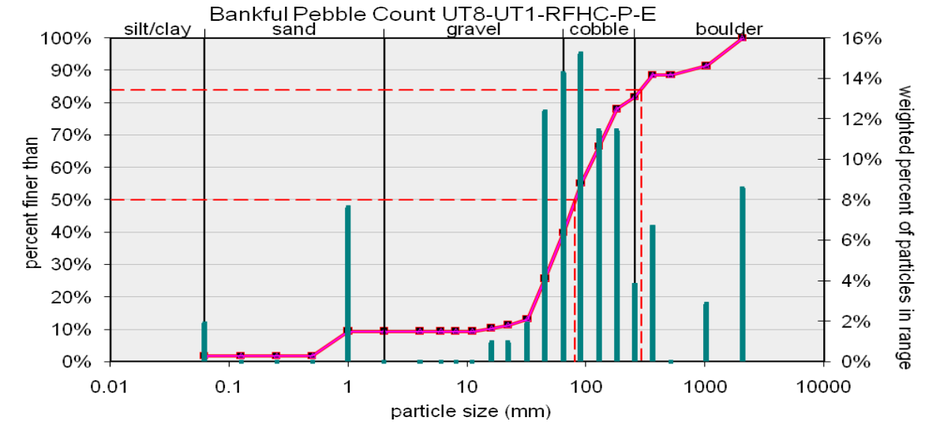
D16	D35	D50	D84	D95
4.5	22	50	130	760

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
0	8	28	20	5	39



D16	D35	D50	D84	D95
34	57	80	290	1400

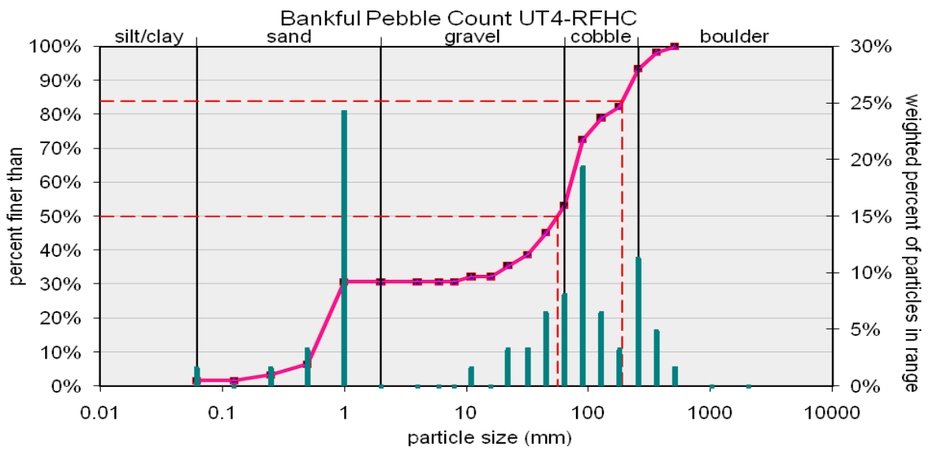
Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
2	7	30	41	18	2



Substrate Characterization

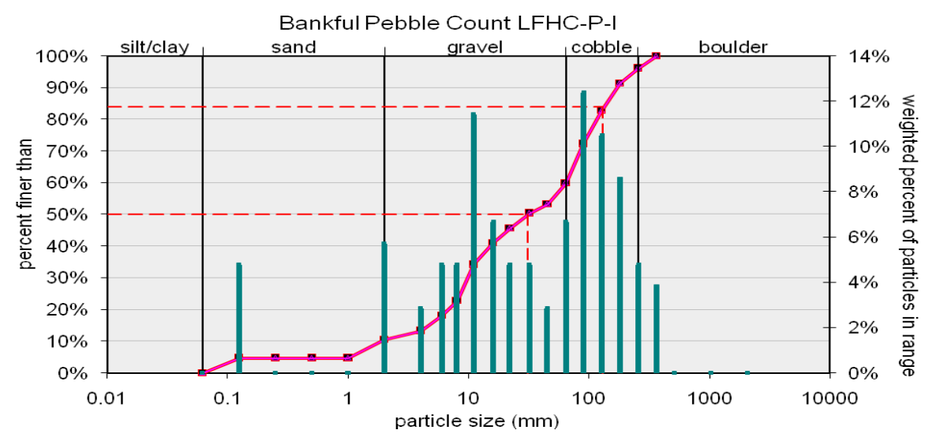
D16	D35	D50	D84	D95
0.66	21	56	190	280

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
1	21	16	29	5	28



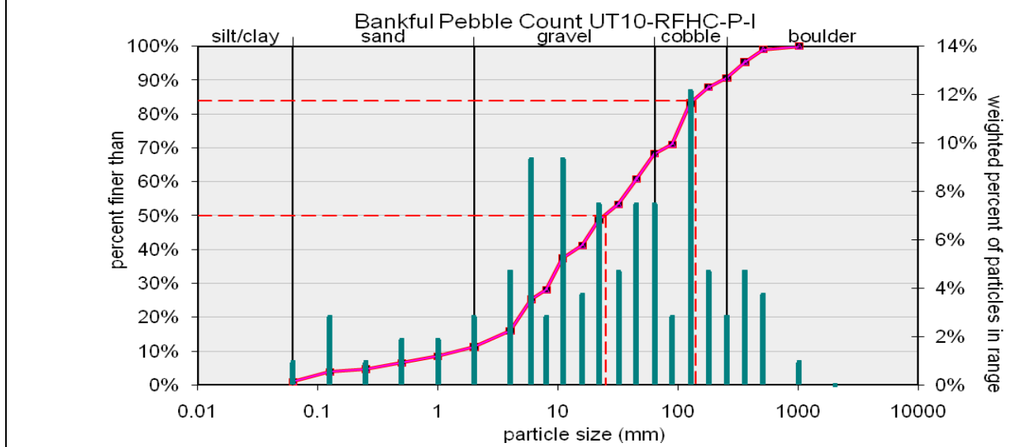
D16	D35	D50	D84	D95
5	11	31	130	230

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
0	10	50	36	4	0



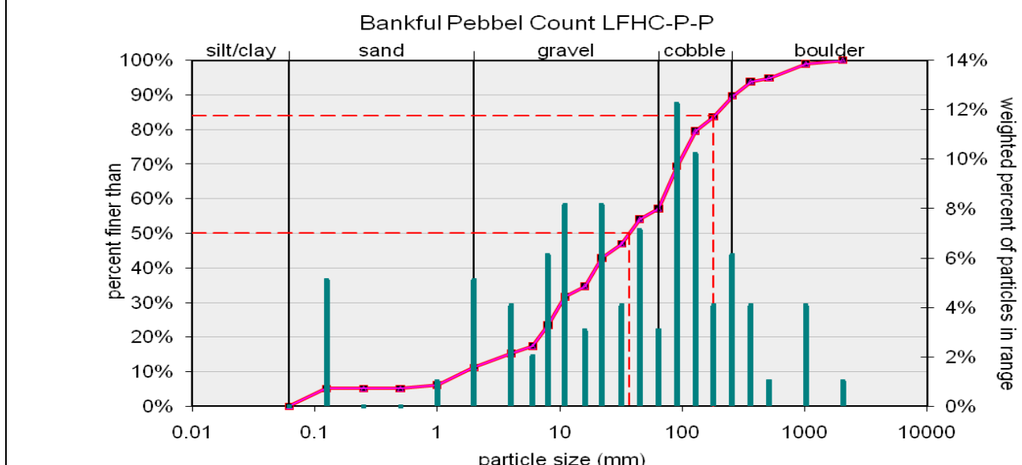
D16	D35	D50	D84	D95
4	10	25	140	350

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
1	10	57	22	9	0



D16	D35	D50	D84	D95
4.6	16	37	180	250

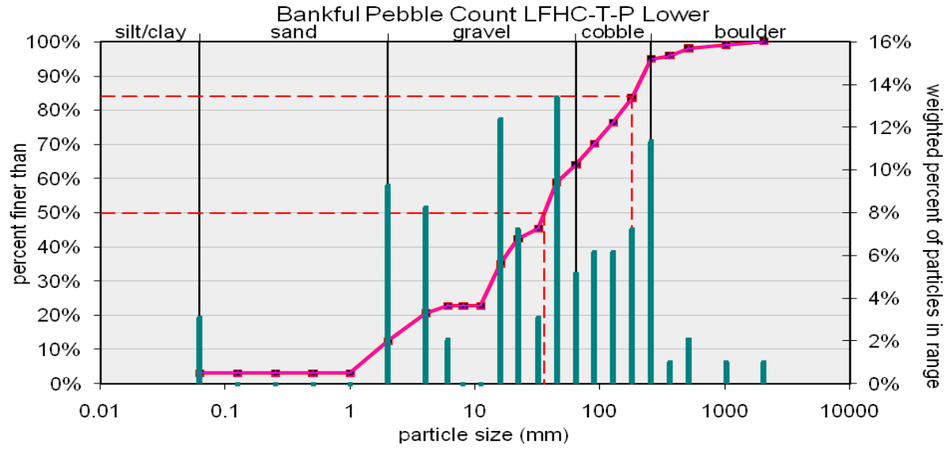
Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
0	10	41	29	9	12



Substrate Characterization

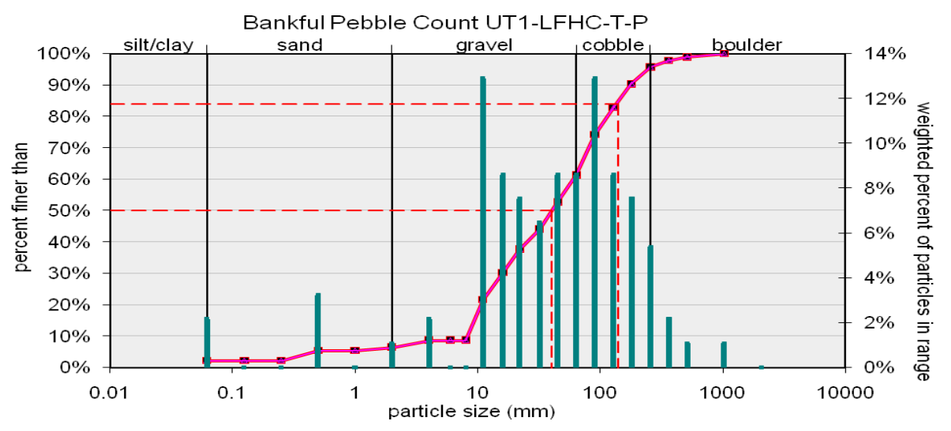
D16	D35	D50	D84	D95
2.7	16	36	180	270

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
3	9	50	30	5	4



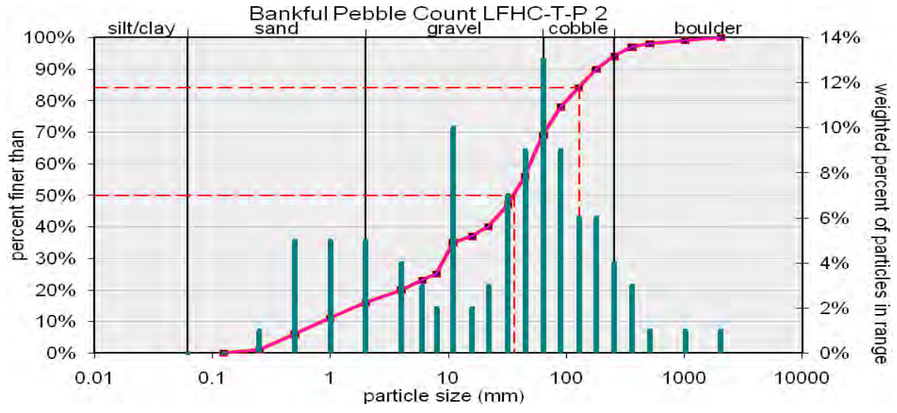
D16	D35	D50	D84	D95
9.6	20	40	140	240

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
2	4	51	32	4	7



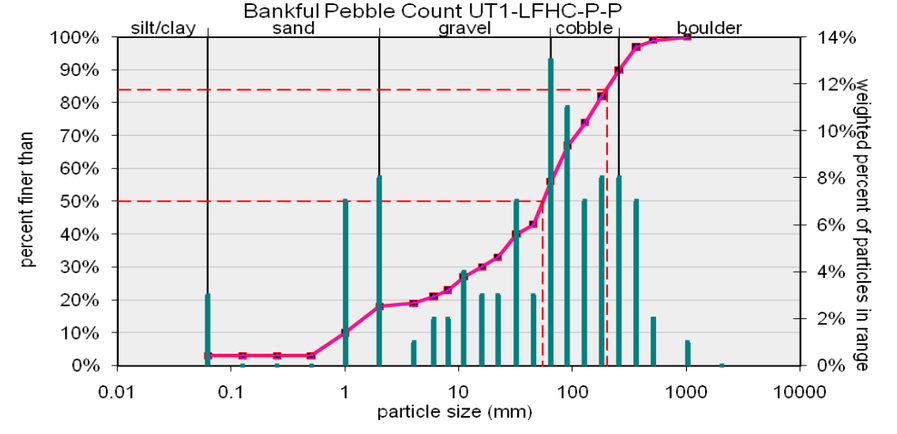
D16	D35	D50	D84	D95
2	11	36	130	290

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
0	16	53	25	6	0



D16	D35	D50	D84	D95
1.7	24	54	200	330

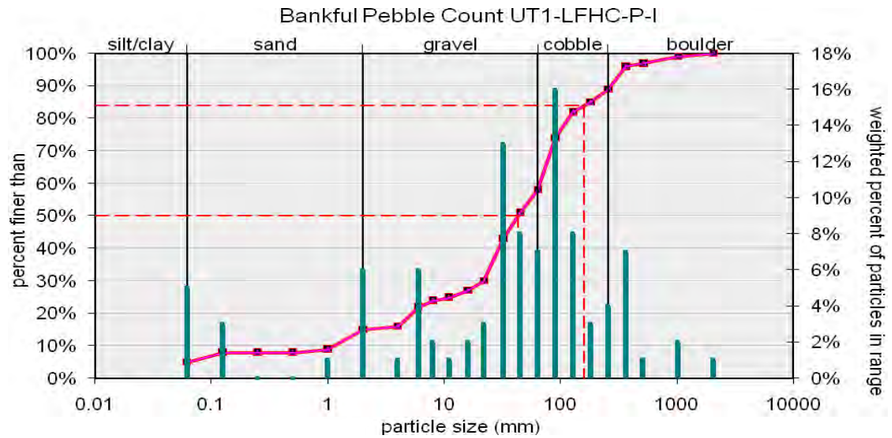
Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
3	15	37	33	10	3



Substrate Characterization

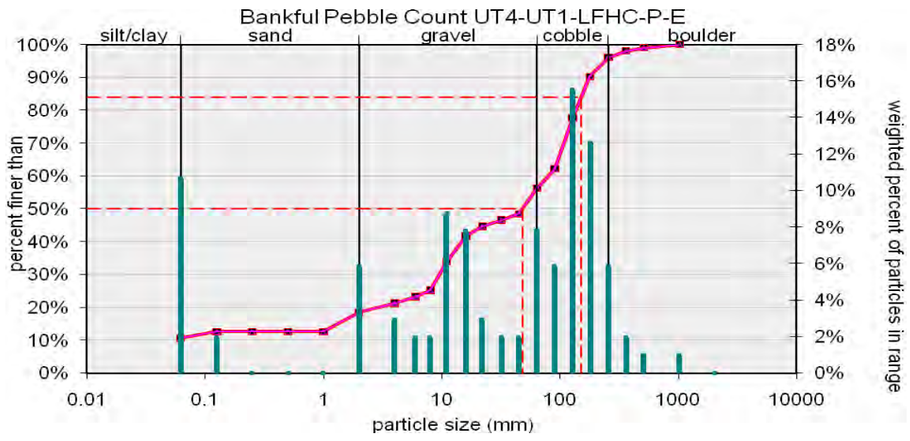
D16	D35	D50	D84	D95
4	25	43	160	340

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
5	10	43	31	11	0



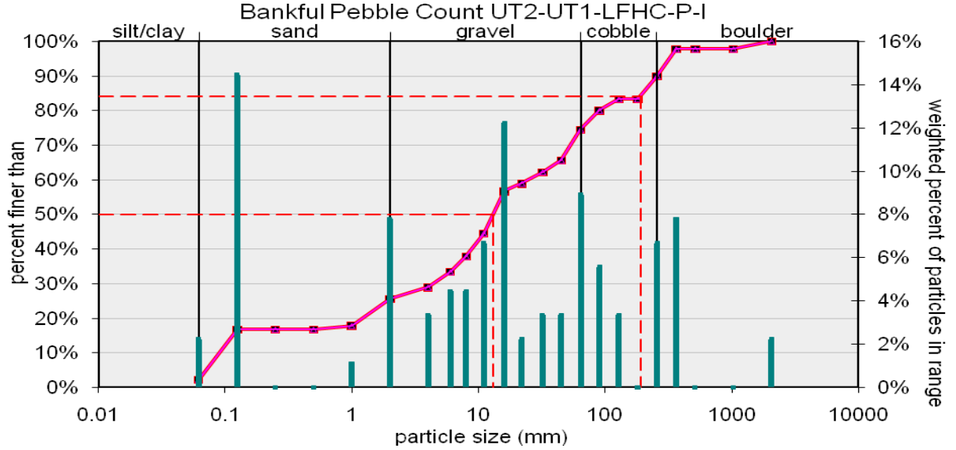
D16	D35	D50	D84	D95
1.5	12	48	150	240

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
11	8	38	40	4	0



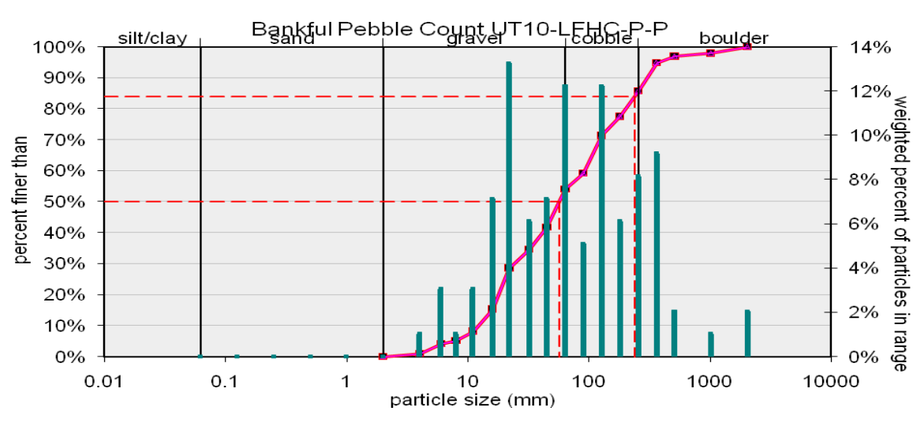
D16	D35	D50	D84	D95
0.12	6.7	13	190	320

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
2	21	44	14	9	9



D16	D35	D50	D84	D95
16	32	57	240	370

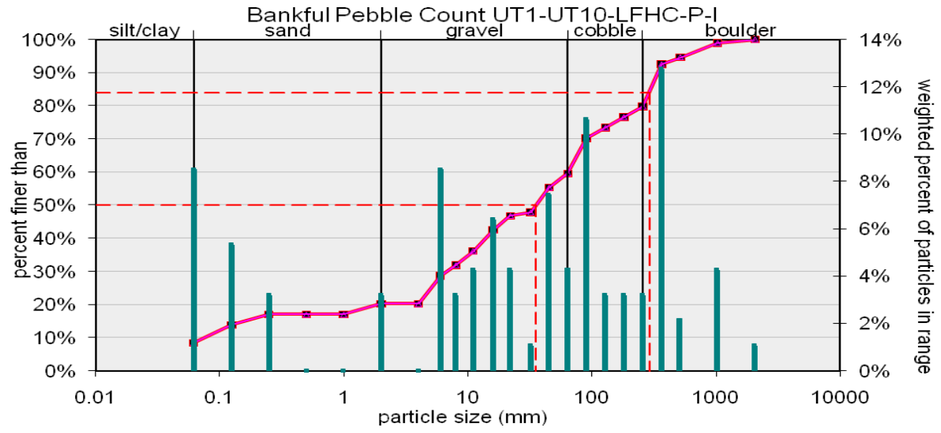
Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
0	0	50	29	13	7



Substrate Characterization

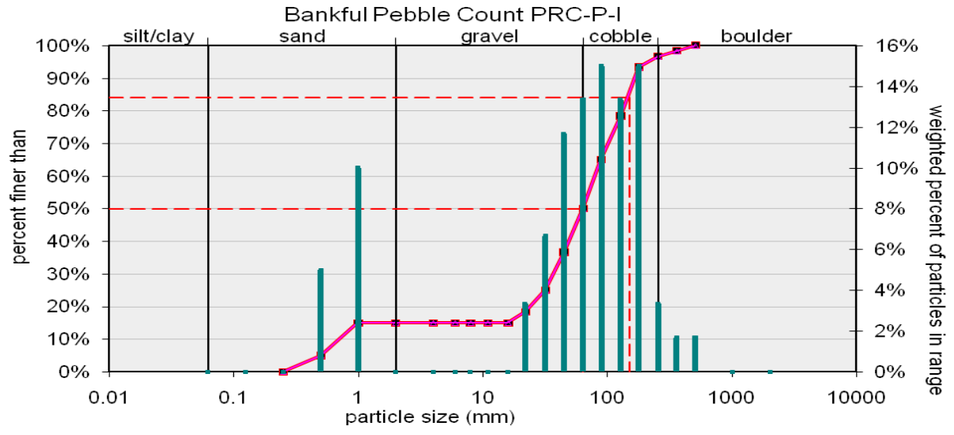
D16	D35	D50	D84	D95
0.2	10	35	290	540

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
8	11	36	18	18	9



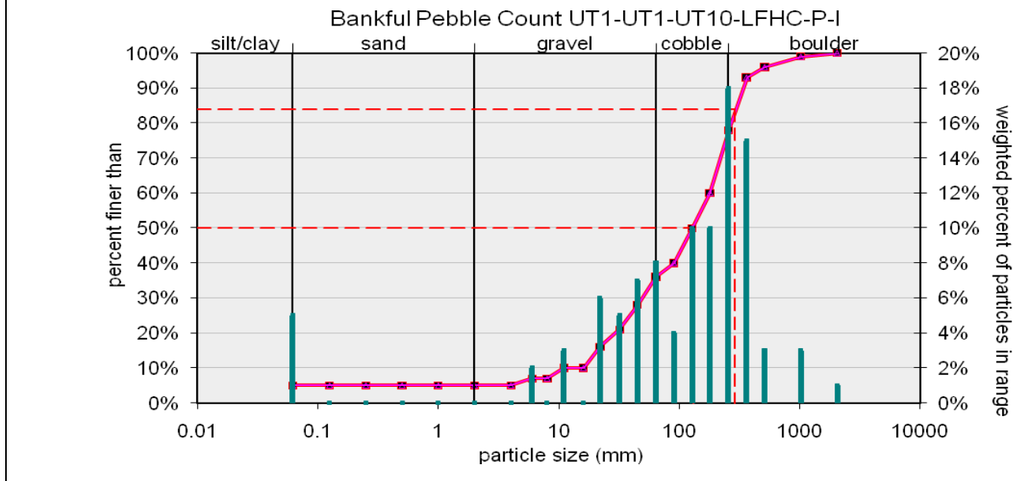
D16	D35	D50	D84	D95
18	43	64	150	210

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
0	11	25	33	2	30



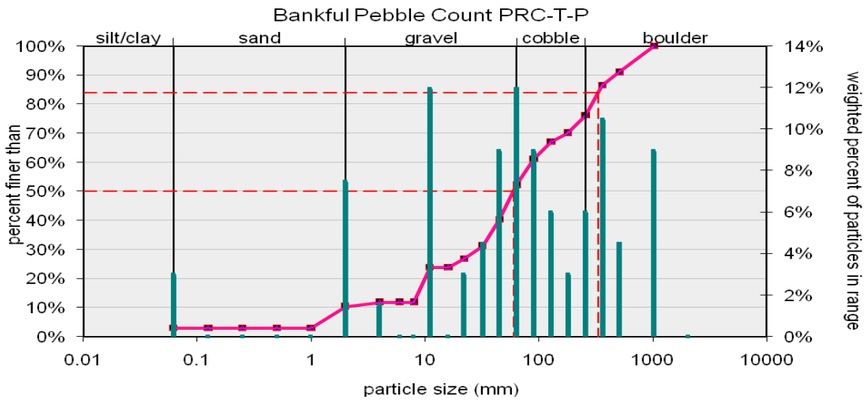
D16	D35	D50	D84	D95
22	61	130	290	460

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
5	0	31	42	22	0



D16	D35	D50	D84	D95
8.9	37	60	330	700

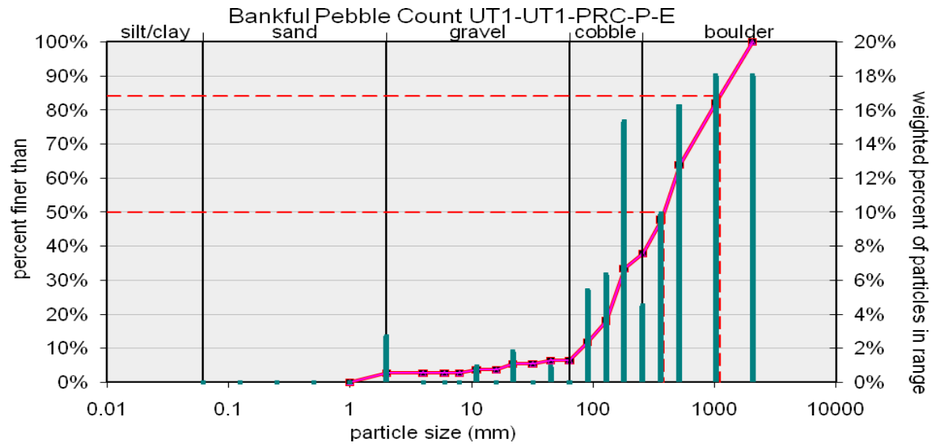
Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
2	6	31	18	18	25



Substrate Characterization

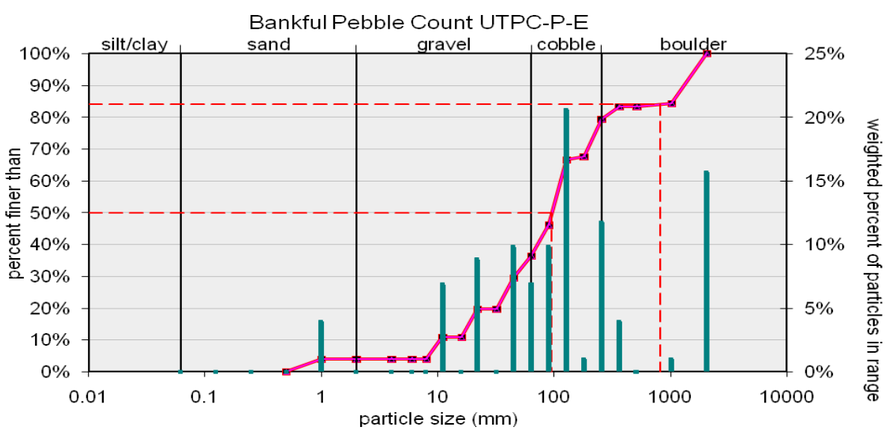
D16	D35	D50	D84	D95
110	210	380	1100	1700

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
0	3	4	32	62	0



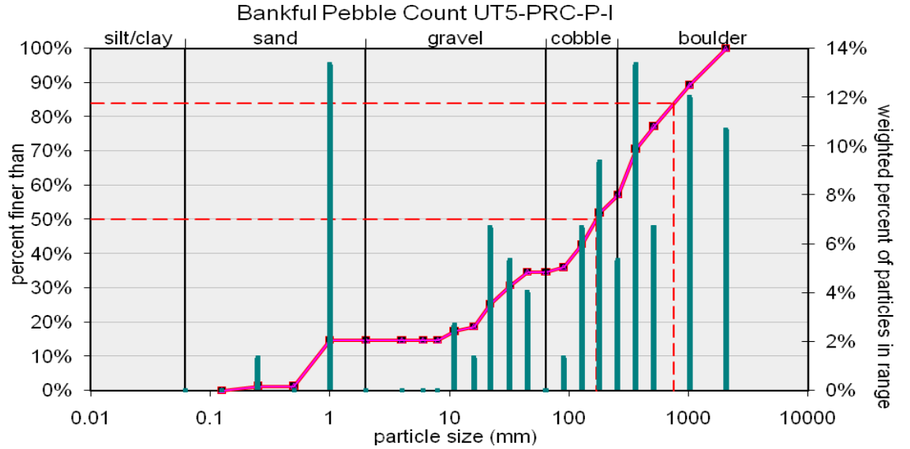
D16	D35	D50	D84	D95
19	60	96	820	1600

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
0	4	32	43	21	0



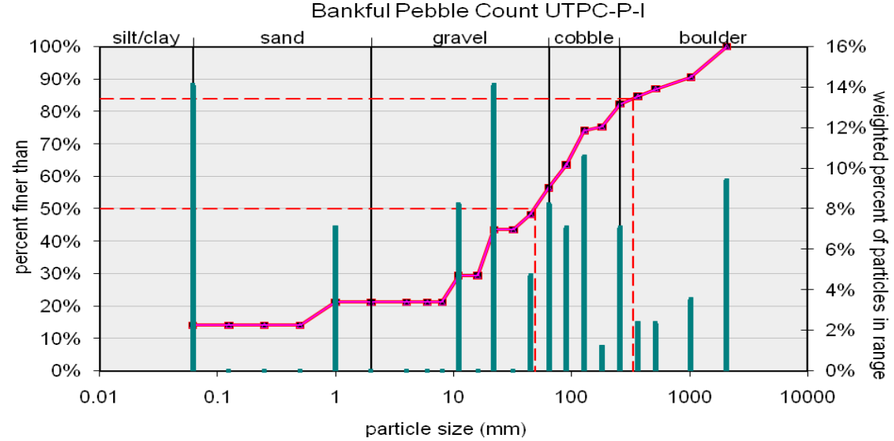
D16	D35	D50	D84	D95
9.4	70	170	750	1500

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
0	12	16	18	34	20



D16	D35	D50	D84	D95
0.6	18	49	330	1400

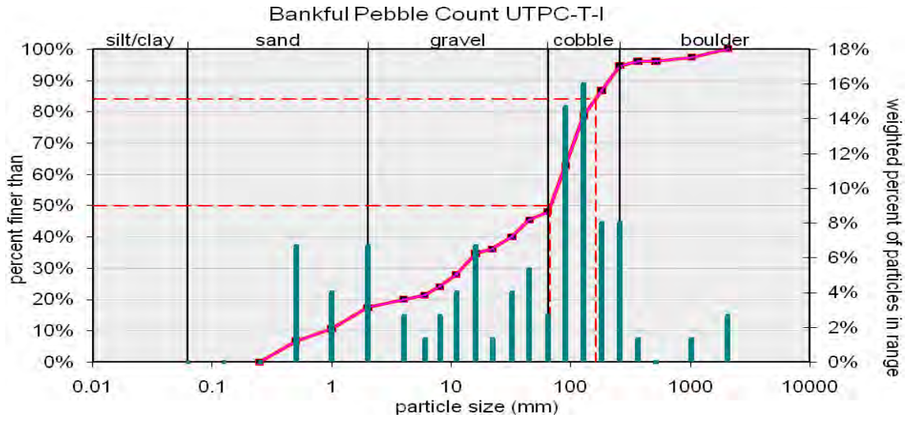
Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
12	6	30	22	15	16



Substrate Characterization

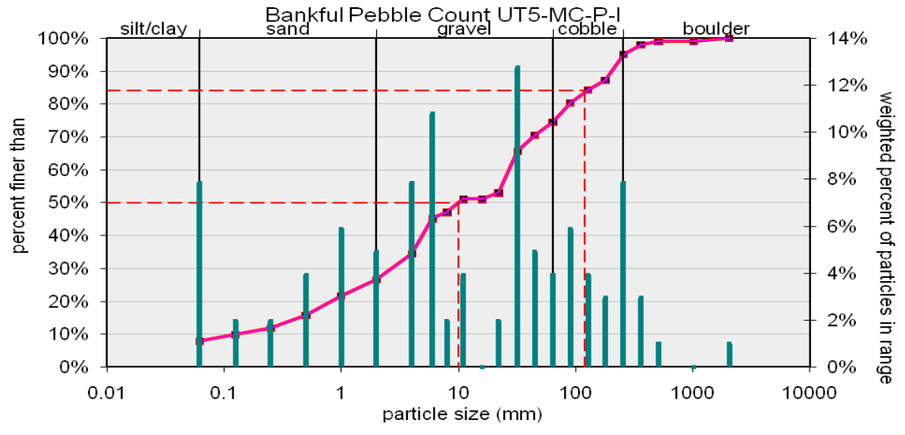
D16	D35	D50	D84	D95
1.7	17	67	160	280

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
0	14	25	37	4	20



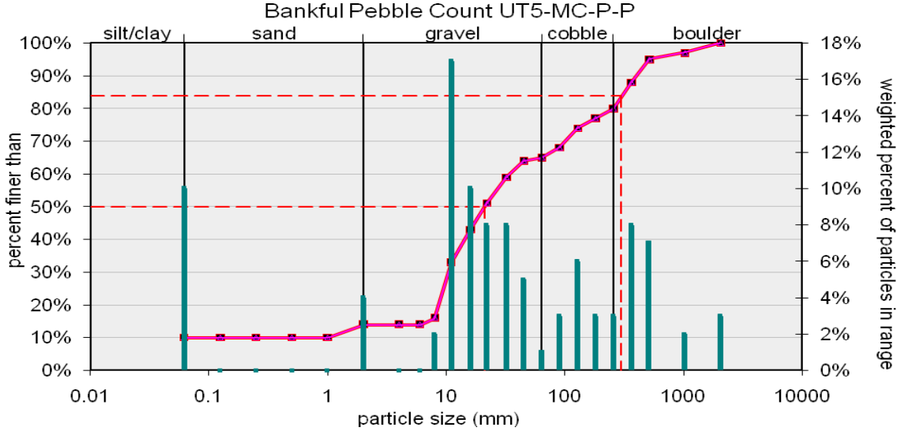
D16	D35	D50	D84	D95
0.52	4.1	10	120	250

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
8	19	48	21	5	0



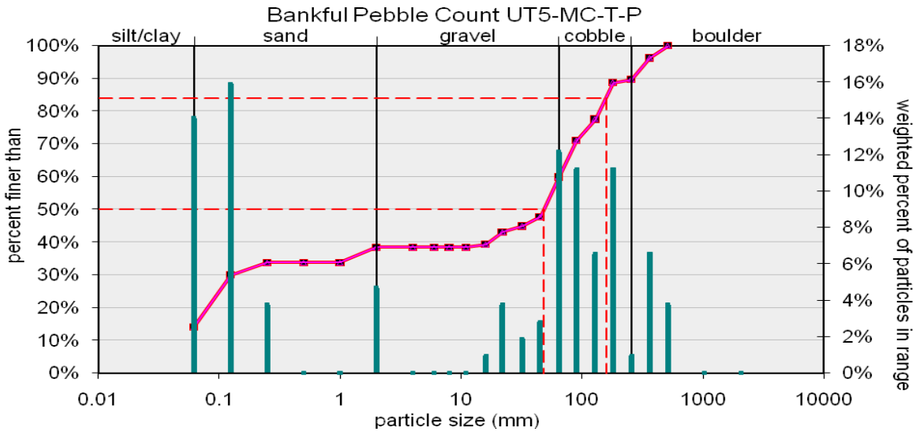
D16	D35	D50	D84	D95
8	12	21	300	510

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
10	4	51	15	20	0



D16	D35	D50	D84	D95
0.068	1.2	48	160	340

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
14	24	21	30	10	0

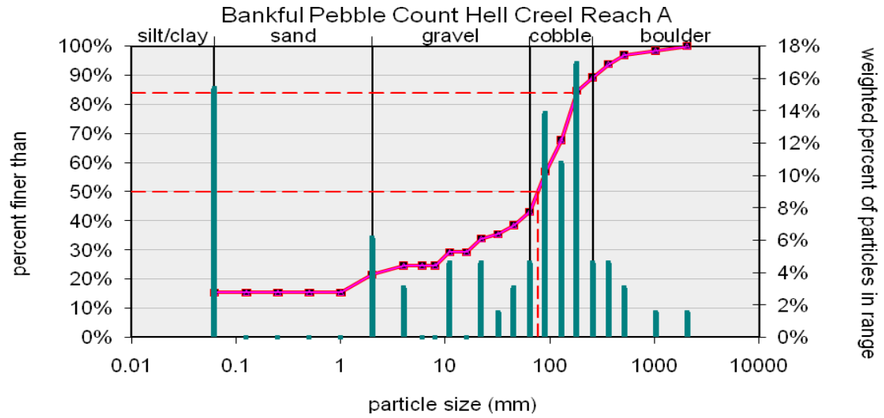


Substrate Characterization

Mitigation Site Pebble Counts

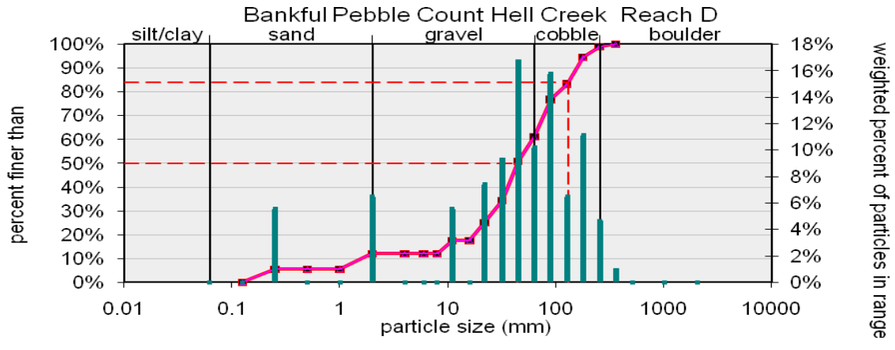
D16	D35	D50	D84	D95
1.1	29	76	180	410

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
11	5	16	34	8	27



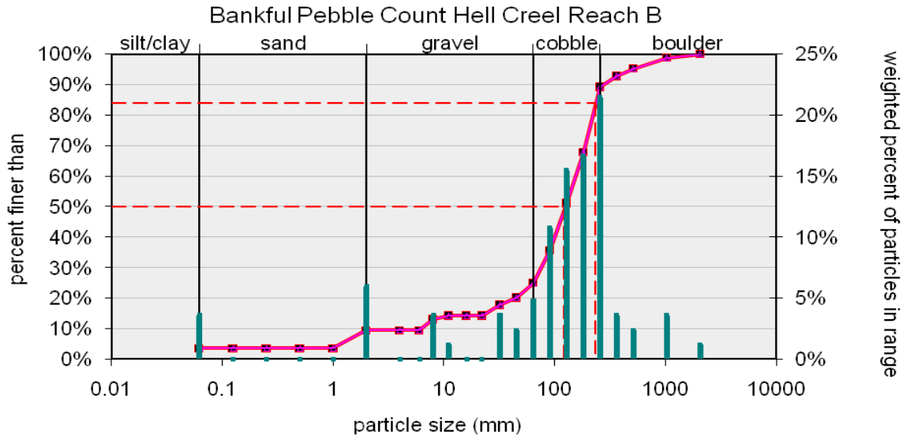
D16	D35	D50	D84	D95
10	32	44	130	190

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
0	12	49	38	1	0



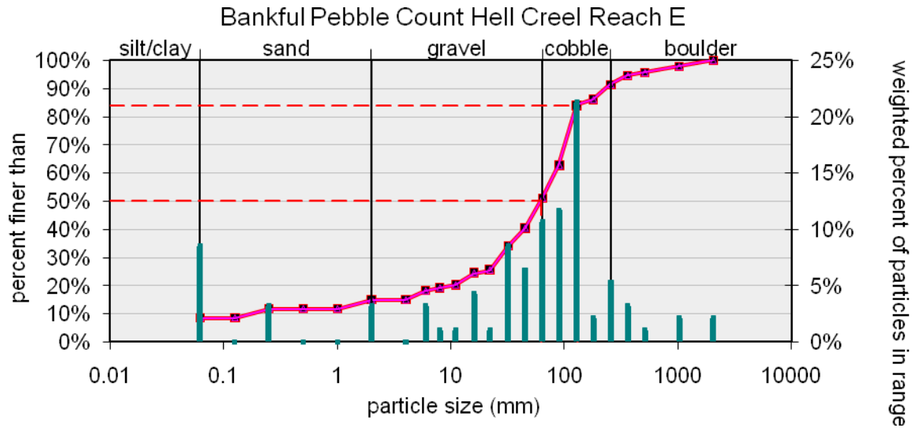
D16	D35	D50	D84	D95
26	88	120	230	490

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
3	5	13	55	9	14



D16	D35	D50	D84	D95
4.6	34	62	130	400

Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
8	6	34	38	8	6



Substrate Characterization

APPENDIX F

PHOTOGRAPHS

PROPOSED IMPACT STREAMS

PHOTOS

RUTH TRACE BRANCH WATERSHED

Ruth Trace Branch

Photos 1-4: Proposed impact reach of Ruth Trace Branch

Unnamed Tributaries of Ruth Trace Branch

Photo 8: Proposed impact reach of UT3 of Ruth Trace Branch

Photo 9: Proposed impact reach of UT8 of Ruth Trace Branch

Photo 10: Proposed impact reach of UT10 of Ruth Trace Branch

Photo 11: Proposed impact reach of UT12 of Ruth Trace Branch

Unnamed Tributaries of Ruth Trace Branch

Photo 12: Proposed impact reach of UT13 of Ruth Trace Branch

Photo 13: Proposed impact reach of UT 15 of Ruth Trace Branch

Photo 14: Proposed impact reach of UT17 of Ruth Trace Branch

Photo 15: Proposed impact reach of UT1 of UT17 of Ruth Trace Branch

Unnamed Tributaries of Ruth Trace Branch

Photo 16: Proposed impact reach of UT18 of Ruth Trace Branch

Photo 17: Proposed impact reach of UT19 of Ruth Trace Branch

CONLEY BRANCH WATERSHED

Right Fork of Conley Branch

Photos 18-21: Proposed impact reach of Right Fork Conley Branch

Unnamed Tributaries of Right Fork Conley Branch

Photo 22: Proposed impact reach of UT1 of Right Fork Conley Branch

Photo 23: Proposed impact reach of UT1 of UT1 of Right Fork of Conley Branch

Photo 24: Proposed impact reach of UT2 of UT1 of Right Fork Conley Branch

Unnamed Tributaries of Right Fork Conley Branch

Photo 25: Proposed impact reach of UT2 of Right Fork Conley Branch

Photo 26: Proposed impact reach of UT3 of Right Fork Conley Branch

Photo 27: Proposed impact reach of UT4 of Right Fork Conley Branch

Photo 28: Proposed impact reach of UT5 of Right Fork Conley Branch

Left Fork Conley Branch

Photos 29-32: Proposed impact reach of Left Fork Conley Branch

HELL CREEK WATERSHED

Right Fork of Hell Creek

Photos 33-36: Proposed impact reach on Right Fork of Hell Creek

Right Fork of Hell Creek

Photos 37-40: Proposed impact reach on Right Fork of Hell Creek

Unnamed Tributaries of Right Fork of Hell Creek

Photo 41: Proposed impact reach of UT1 of Right Fork of Hell Creek

Photo 42: Proposed impact reach of UT10 of UT1 of Right Fork of Hell Creek

Photo 43: Proposed impact reach of UT11 of UT1 of Right Fork of Hell Creek

Unnamed Tributaries of Right Fork of Hell Creek

Photo 44: Proposed impact reach of UT4 of Right Fork of Hell Creek

Photo 45: Proposed impact reach of UT1 of UT4 of Right Fork of Hell Creek

Photo 46: Proposed impact reach of UT3 of UT4 of Right Fork of Hell Creek

Unnamed Tributaries of Right Fork of Hell Creek

Photo 47: Proposed impact reach of UT5 of Right Fork of Hell Creek

Photo 48: Proposed impact reach of UT6 of Right Fork of Hell Creek

Photo 49: Proposed impact reach of UT7 of Right Fork of Hell Creek

Unnamed Tributaries of Right Fork of Hell Creek

Photo 50: Proposed impact reach of UT10 of Right Fork of Hell Creek

Photo 51: Proposed impact reach of UT11 of Right Fork of Hell Creek

Left Fork of Hell Creek

Photos 52-55: Proposed impact reach of Left Fork of Hell Creek

Unnamed Tributaries of Left Fork of Hell Creek

Photo 56: Proposed impact reach of UT1 of Left Fork of Hell Creek

Photo 57: Proposed impact reach of UT2 of UT1 of Left Fork of Hell Creek

Photo 58: Proposed impact reach of UT5 of UT1 of Left Fork of Hell Creek

Unnamed Tributaries of Left Fork of Hell Creek

Photo 59: Proposed impact reach of UT8 of Left Fork of Hell Creek

Photo 60: Proposed impact reach of UT9 of Left Fork of Hell Creek

Unnamed Tributaries of Left Fork of Hell Creek

Photo 61: Proposed impact reach of UT10 of Left Fork of Hell Creek

Photo 62: Proposed impact reach of UT1 of UT10 of Left Fork of Hell Creek

Photo 63: Proposed impact reach of UT1 of UT1 of UT10 of Left Fork of Hell Creek

Photo 64: Proposed impact reach of UT2 of UT10 of Left Fork of Hell Creek

Unnamed Tributaries of Left Fork of Hell Creek

Photo 65: Proposed impact reach of UT11 of Left Fork of Hell Creek

Photo 66: Proposed impact reach of UT12 of Left Fork of Hell Creek

PIGEONROOST CREEK WATERSHED

Pigeonroost Creek

Photos 67-70: Proposed impact reach of Pigeonroost Creek

Unnamed Tributaries of Pigeonroost Creek

Photo 71: Proposed impact reach of UT1 of UT1 of Pigeonroost Creek

Photo 72: Proposed impact reach of UT2 of Pigeonroost Creek

Photo 73: Proposed impact reach of UT3 of Pigeonroost Creek

Photo 74: Proposed impact reach of UT5 of Pigeonroost Creek

UNNAMED TRIBUTARY OF PIGEON CREEK

Unnamed Tributary of Pigeon Creek

Photos 75-77: Proposed impact reach of Unnamed Tributary of Pigeon Creek

Unnamed Tributaries of Unnamed Tributary of Pigeon Creek

Photo 78: Proposed impact reach of UT6 of Unnamed Tributary of Pigeon Creek

Photo 79: Proposed impact reach of UT7 of Unnamed Tributary of Pigeon Creek

Photo 80: Proposed impact reach of UT8 of Unnamed Tributary of Pigeon Creek

UNNAMED TRIBUTARY OF STONECOAL BRANCH

Unnamed Tributary of Stonecoal Branch

Photos 81-84: Proposed impact reach of Stonecoal Branch

UNNAMED TRIBUTARIES OF MILLER CREEK

Unnamed Tributary 4 of Miller Creek

Photos 85-86: Proposed impact reach of Unnamed Tributary 4 of Miller Creek

Unnamed Tributary 5 of Miller Creek

Photos 87-99: Proposed impact reach of Unnamed Tributary 5 of Miller Creek

PROPOSED MITIGATION REACHES

PHOTOS

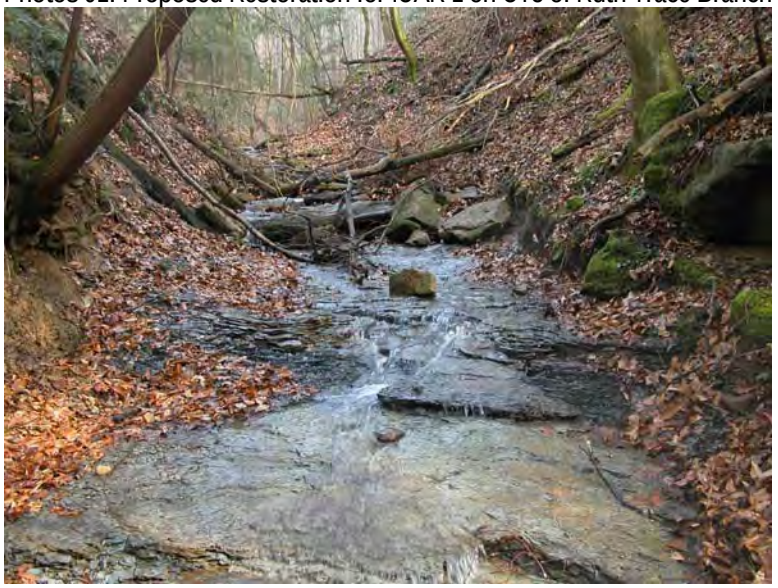
PROPOSED ON-SITE RESTORATION REACHES

Ruth Trace Branch and Tributaries

Photos 90: Proposed Restoration for Pond 1 on Ruth Trace Branch

Photos 91: Proposed Restoration for IUAR 1 on UT3 of Ruth Trace Branch

Photos 92: Proposed Restoration for Pond 1 on UT8 of Ruth Trace Branch



Photos 93
: Proposed Restoration for Pond 1 on UT10 of Ruth Trace Branch

Conley Branch and Tributaries

Photos 94: Proposed Restoration for Pond 2 on Right Fork of Conley Branch

Photos 95: Proposed Restoration for Pond 2 on UT2 of Right Fork of Conley Branch

Photos 96: Proposed Restoration for Pond 2 on UT3 of Right Fork of Conley Branch

Photos 97: Proposed Restoration for Pond 3 on UT1 of Right Fork of Conley Branch

Conley Branch and Tributaries

Photos 98: Proposed Restoration for Pond 3/IUAR 3 on UT1 of UT1 of Right Fork of Conley Branch

Photos 99: Proposed Restoration for Pond 6 on Left Fork of Conley Branch

Right Fork of Hell Creek and Tributaries

Photos 100: Proposed Restoration for Pond 5 on UT1 Right Fork of Hell Creek

Photos 101: Proposed Restoration for Pond 7 on Right Fork of Hell Creek

Right Fork of Hell Creek and Tributaries

Photo 102: Proposed Restoration for Pond 8 on Right Fork of Hell Creek

Photos 103: Proposed Restoration for Pond 8/IUAR 8 on UT5 of Right Fork of Hell Creek

Photos 104: Proposed Restoration for Pond 8/IUAR 8 on UT6 of Right Fork of Hell Creek

Left Fork of Hell Creek and Tributaries

Photos 105: Proposed Restoration for Pond 9 on UT1 Left Fork of Hell Creek

Photos 106: Proposed Restoration for Pond 9 on UT1 of Left Fork of Hell Creek

Photos 107: Proposed Restoration for Pond 10 on Left Fork of Hell Creek

Left Fork of Hell Creek and Tributaries

Photos 108: Proposed Restoration for Pond 10 on UT8 of Left Fork of Hell Creek

Photos 109: Proposed Restoration for IUAR 10 on UT8 of Left Fork of Hell Creek

Photos 110: Proposed Restoration for Pond 10 on UT9 of Left Fork of Hell Creek

Photos 111: Proposed Restoration for Pond 10 on UT10 of Left Fork of Hell Creek

Pigeonroost Creek and Tributaries

Photos 112: Proposed Restoration for Pond 11 on Pigeonroost Creek

Photos 113: Proposed Restoration for Pond 11/IUAR 11 on UT2 of Pigeonroost Creek

Unnamed Tributary of Pigeon Creek and Tributaries

Photos 114: Proposed Restoration for Pond 12 on Unnamed Tributary of Pigeon Creek

Photos 115: Proposed Restoration for IUAR 12 on UT6 of Unnamed Tributary of Pigeon Creek (lower crossing)

Photos 116: Proposed Restoration for IUAR 12 on UT6 of Unnamed Tributary of Pigeon Creek (upper crossing)

Unnamed Tributaries of Miller Creek

Photos 117: Proposed Restoration for Pond 6 on UT5 of Miller Creek

PROPOSED OFF-SITE RESTORATION AND WATER QUALITY REACHES

Photos 118-119: Proposed Enhancement Reach B2

Photos 120-123: Proposed restoration Reach C

Photos 124-127: Proposed Restoration and Water Quality Reach D

Photos 128-131: Proposed Restoration and Water Quality Reach E

Photos 132-133: Proposed Restoration and Water Quality Reach E

PROPOSED ENHANCEMENT REACHES




Photos 134-137: Proposed Enhancement Reach A

Photos 138-141: Proposed Enhancement Reach B1

Photos 142-143: Proposed Enhancement reach B1

PROPOSED PRESERVATION REACHES

Photo 144: Proposed preservation reach of LUT2 of Right Fork of Hell Creek

Photo 145: Proposed preservation reach of UT1 of Right Fork of Hell Creek

Photo 146: Proposed preservation reach of UT1 of UT1 of Right Fork of Hell Creek

Photo 147: Proposed preservation reach of UT2 of Right Fork of Hell Creek

Photo 148: Proposed preservation reach of UT5 of Right Fork of Hell Creek

Photo 149: Proposed preservation reach of UT6 of Right Fork of Hell Creek

APPENDIX G

BIOTIC ASSESSMENT DATA

Impact Habitat Assessment Values (HAVs); (March – May, 2006)

Stream Name	Ruth Trace Branch (RTB)				UT3 of RTB	UT8 of RTB	UT10 of RTB	UT12 of RTB	UT13 of RTB	UT15 of RTB	UT17 of RTB	UT1 of UT17 of RTB	UT18 of RTB	UT19 of RTB
Gradient	high	high	high	high	high	high	high	high	high	high	high	high	high	high
Station	19+30	31+30	40+30	48+30	5+00	1+00	1+00	1+00	1+00	0+00	0+00	8+00	1+00	0+00
Stream Classification[1]	P	P	P	I	I	I	P	I	I	P	I	E	I	I
1. Epifaunal Substrate/ Available Cover (0-20)	7	8	8	5	5	4	13	3	3	3	8	0	3	3
2. Embeddedness (0-20)	6	8	8	4	11	11	14	2	3	2	6	2	2	2
3. Velocity/Depth Regime (0-20)	13	7	9	6	8	3	12	2	1	1	8	0	2	1
4. Sediment Deposition (0-20)	6	6	8	3	11	11	14	2	3	2	8	2	2	2
5. Channel Flow Status (0-20)	12	8	9	6	1	3	17	1	1	1	9	0	4	3
6. Channel Alteration (0-20)	12	13	14	11	17	18	16	14	15	14	13	14	11	10
7. Frequency of Riffles (0-20)	10	13	10	10	15	8	15	2	4	2	10	0	2	3
8. Left Bank Stability (0-10)	6	8	7	8	5	8	5	8	7	6	6	7	6	7
8. Right Bank Stability (0-10)	7	8	7	8	4	8	6	7	6	7	6	7	6	7
9. Left Vegetative Protection (0-10)	7	9	7	8	8	7	7	8	8	7	6	8	7	8
9. Right Vegetative Protection (0-10)	7	9	7	8	8	7	8	8	8	8	6	8	7	8
10. Left Riparian Vegetative Zone Width (0-10)	9	9	9	8	10	9	9	9	9	9	8	9	8	8
10. Right Riparian Vegetative Zone Width (0-10)	9	9	9	8	10	9	9	9	9	9	8	9	8	8
Habitat Assessment Value (0-200)	111	115	112	93	113	106	145	75	77	71	102	66	68	70
Average	108										84			

[1]P = Perennial, I = Intermittent, E = Ephemeral

Impact Habitat Assessment Values (HAVs); (March – May, 2006)

Stream Name	Right Fork Conley Branch (RFCB)			UT1 of RFCB	UT1 of UT1 of RFCB	UT2 of UT1 of RFCB	UT2 of RFCB	UT3 of RFCB	UT4 of RFCB	UT5 of RFCB
Gradient	high	high	high	high	high	high	high	high	high	high
Station	19+00	34+00	34+00	23+00	1+00	0+00	2+00	1+00	1+00	1+00
Stream Classification[1]	P	I	E	I	I	I	I	P	I	I
1. Epifaunal Substrate/ Available Cover (0-20)	14	5	0	17	15	6	13	10	10	7
2. Embeddedness (0-20)	3	3	7	12	11	10	3	15	10	11
3. Velocity/Depth Regime (0-20)	8	4	0	7	10	1	8	7	8	1
4. Sediment Deposition (0-20)	5	4	16	12	15	13	11	15	15	13
5. Channel Flow Status (0-20)	11	6	0	7	15	1	12	10	7	1
6. Channel Alteration (0-20)	15	15	18	14	16	17	17	18	16	17
7. Frequency of Riffles (0-20)	8	4	0	6	15	1	8	10	5	1
8. Left Bank Stability (0-10)	3	1	4	7	8	6	7	9	6	5
8. Right Bank Stability (0-10)	4	1	4	7	8	6	7	9	6	5
9. Left Vegetative Protection (0-10)	4	1	5	8	8	7	8	8	7	6
9. Right Vegetative Protection (0-10)	4	1	5	8	8	7	8	8	7	6
10. Left Riparian Vegetative Zone Width (0-10)	4	7	9	7	9	7	8	9	8	9
10. Right Riparian Vegetative Zone Width (0-10)	8	7	9	3	9	4	8	9	8	9
Habitat Assessment Value (0-200)	91	59	77	115	147	86	118	137	113	91
Average	76			116						

[1]P = Perennial, I = Intermittent, E = Ephemeral

Impact Habitat Assessment Values (HAVs); (March – May, 2006)

Stream Name	Left Fork of Conley Branch (LFCB)	
Gradient	high	high
Station	45+00	56+00
Stream Classification[1]	I	I
1. Epifaunal Substrate/ Available Cover (0-20)	3	6
2. Embeddedness (0-20)	2	15
3. Velocity/Depth Regime (0-20)	6	6
4. Sediment Deposition (0-20)	4	16
5. Channel Flow Status (0-20)	9	1
6. Channel Alteration (0-20)	12	18
7. Frequency of Riffles (0-20)	8	11
8. Left Bank Stability (0-10)	8	9
8. Right Bank Stability (0-10)	8	9
9. Left Vegetative Protection (0-10)	7	8
9. Right Vegetative Protection (0-10)	7	8
10. Left Riparian Vegetative Zone Width (0-10)	9	9
10. Right Riparian Vegetative Zone Width (0-10)	9	9
Habitat Assessment Value (0-200)	92	125
Average	109	

[1]P = Perennial, I = Intermittent, E = Ephemeral

Impact Habitat Assessment Values (HAVs); (March – May, 2006)

Stream Name	Right Fork of Hell Creek (RFHC)				UT4 of RFHC	UT1 of UT4 of RFHC	UT3 of UT4 of RFHC	UT5 of RFHC	UT6 of RFHC	UT7 of RFHC	UT10 of RFHC	UT11 of RFHC	UT1 of Right Fork of Hell Creek (RFHC)		UT10 of UT1 of RFHC	UT11 of UT1 of RFHC	UT11 of UT1 of RFHC
Gradient	high	high	high	high	high	high	high	high	high	high	high	high	high	high	high	high	high
Station	8+71	12+71	41+71	60+71	15+00	0+00	1+00	1+00	1+00	1+00	1+00	1+00	32+00	36+00	0+00	0+00	6+00
Stream Classification[1]	P	P	P	E	I	I	I	I	I	E	I	I	P	I	I	I	E
1. Epifaunal Substrate/ Available Cover (0-20)	11	6	12	0	16	2	10	7	12	0	7	4	3	4	2	3	0
2. Embeddedness (0-20)	7	2	10	10	4	2	9	5	4	13	10	2	4	5	2	4	4
3. Velocity/Depth Regime (0-20)	9	6	7	0	10	2	8	5	6	0	9	1	3	4	2	4	0
4. Sediment Deposition (0-20)	7	3	4	13	9	1	11	14	12	15	10	2	4	7	1	3	4
5. Channel Flow Status (0-20)	11	11	10	0	10	1	10	8	8	0	11	1	7	6	3	7	0
6. Channel Alteration (0-20)	12	7	16	16	17	6	15	16	17	16	16	10	8	12	2	9	11
7. Frequency of Riffles (0-20)	17	5	7	0	5	3	6	7	6	0	6	2	7	7	2	4	0
8. Left Bank Stability (0-10)	1	0	1	2	2	7	4	8	5	6	2	7	4	7	5	5	7
8. Right Bank Stability (0-10)	7	3	1	5	2	7	4	8	5	4	2	7	5	7	5	6	7
9. Left Vegetative Protection (0-10)	0	0	2	3	4	7	7	7	6	5	5	8	7	9	5	7	8
9. Right Vegetative Protection (0-10)	3	3	2	3	4	8	7	7	6	5	5	8	7	9	5	7	8
10. Left Riparian Vegetative Zone Width (0-10)	8	0	3	2	7	9	6	5	4	6	4	8	8	9	7	9	9
10. Right Riparian Vegetative Zone Width (0-10)	3	5	3	2	7	9	6	5	4	6	4	8	8	9	7	9	7
Habitat Assessment Value (0-200)	96	51	78	56	97	64	103	102	95	76	91	68	75	95	48	77	65
Average	70				88								85				

[1]P = Perennial, I = Intermittent, E = Ephemeral

Impact Habitat Assessment Values (HAVs); (March – May, 2006)

Stream Name	Left Fork of Hell Creek (LFHC)			UT8 of LFHC	UT9 of LFHC	UT10 of LFHC	UT1 of UT10 of LFHC	UT1 of UT1 of UT0 of LFHC	UT2 of UT10 of LFHC	UT11 of LFHC		UT12 of LFHC		UT1 of LFHC						UT2 of UT1 LFHC	UT5 of UT1 of LFHC
Gradient	high	high	high	high	high	high	high	high	high	high	high	high	high	high	high	high	high	high	high	high	high	high
Station	11+00	47+00	58+00	0+00	1+00	20+00	3+00	2+00	2+00	1+00	9+00	0+67	2+00	1+00	3+33	16+00	20+00	28+00	35+00	2+00	1+00
Stream Classification[1]	P	P	I	I	I	I	I	I	I	P	I	I	E	P	P	P	P	I	I	I	E
1. Epifaunal Substrate/ Available Cover (0-20)	9	10	16	5	6	12	6	4	6	7	2	9	0	6	10	8	11	14	9	5	0
2. Embeddedness (0-20)	9	12	10	9	6	13	7	6	16	6	1	5	7	8	9	11	9	10	5	3	6
3. Velocity/Depth Regime (0-20)	8	10	8	6	5	10	8	5	6	4	11	3	0	8	13	6	10	14	8	3	0
4. Sediment Deposition (0-20)	14	11	10	10	7	11	7	5	16	13	12	14	10	6	10	10	10	11	7	2	10
5. Channel Flow Status (0-20)	17	12	10	7	2	13	7	3	10	12	1	5	0	10	9	16	13	13	8	5	0
6. Channel Alteration (0-20)	16	18	17	11	11	16	11	11	18	16	16	3	8	7	13	18	15	16	12	11	10
7. Frequency of Riffles (0-20)	12	15	9	5	8	11	5	4	10	9	1	1	0	8	16	19	18	16	7	4	0
8. Left Bank Stability (0-10)	8	8	7	5	8	5	7	6	8	5	7	4	2	6	8	9	7	6	7	7	5
8. Right Bank Stability (0-10)	6	8	6	5	8	5	7	6	8	5	7	4	2	7	8	7	7	6	7	7	5
9. Left Vegetative Protection (0-10)	8	8	7	6	8	6	7	7	9	6	8	5	4	6	8	9	7	7	9	8	5
9. Right Vegetative Protection (0-10)	7	8	7	6	8	6	7	7	9	6	8	5	4	6	8	8	7	7	9	8	5
10. Left Riparian Vegetative Zone Width (0-10)	3	9	9	8	9	8	9	8	8	8	7	6	6	3	9	9	9	9	9	9	8
10. Right Riparian Vegetative Zone Width (0-10)	2	9	9	8	9	8	9	8	8	8	8	2	1	3	9	9	9	9	9	9	8
Habitat Assessment Value (0-200)	119	138	125	91	95	124	97	80	132	105	89	66	44	84	130	139	132	138	106	81	62
Average	127					108				97		55		122							

[1]P = Perennial, I = Intermittent, E = Ephemeral

Impact Habitat Assessment Values (HAVs); (March – May, 2006)

Stream Name	Unnamed Tributary of Pigeon Creek			UT6 of UTPC	
Gradient	high	high	high	high	high
Station	31+82	39+82	45+82	5+00	9+00
Stream Classification[1]	I	I	E	I	E
1. Epifaunal Substrate/ Available Cover (0-20)	8	6	0	2	0
2. Embeddedness (0-20)	7	7	2	2	8
3. Velocity/Depth Regime (0-20)	10	7	0	3	0
4. Sediment Deposition (0-20)	7	6	2	3	11
5. Channel Flow Status (0-20)	10	10	0	5	0
6. Channel Alteration (0-20)	13	14	14	14	16
7. Frequency of Riffles (0-20)	13	10	0	11	0
8. Left Bank Stability (0-10)	4	6	7	6	8
8. Right Bank Stability (0-10)	7	8	7	8	8
9. Left Vegetative Protection (0-10)	5	7	8	7	8
9. Right Vegetative Protection (0-10)	7	8	8	8	8
10. Left Riparian Vegetative Zone Width (0-10)	6	9	9	9	8
10. Right Riparian Vegetative Zone Width (0-10)	8	9	9	9	8
Habitat Assessment Value (0-200)	105	107	66	87	83
Average	93			85	

[1]P = Perennial, I = Intermittent, E = Ephemeral

Impact Habitat Assessment Values (HAVs); (March – May, 2006)

Stream Name	Pigeonroost Creek (PRC)			UT1 of UT1 of PRC	UT2 of PRC	UT3 of PRC	UT5 of PRC	Left Fork PRC	
Gradient	high	high	high	high	high	high	high	high	high
Station	26+00	28+00	38+00	5+00	1+00	1+00	4+00	3+10	4+00
Stream Classification[1]	P	I	I	E	I	I	I	I	E
1. Epifaunal Substrate/ Available Cover (0-20)	10	17	5	0	14	11	17	11	0
2. Embeddedness (0-20)	14	11	10	13	2	19	16	16	18
3. Velocity/Depth Regime (0-20)	8	8	1	0	10	2	16	7	0
4. Sediment Deposition (0-20)	13	10	12	12	5	16	13	16	16
5. Channel Flow Status (0-20)	8	12	1	0	10	2	12	6	0
6. Channel Alteration (0-20)	18	19	18	12	17	19	19	16	16
7. Frequency of Riffles (0-20)	9	11	1	0	6	2	10	6	0
8. Left Bank Stability (0-10)	7	5	6	4	6	6	3	9	9
8. Right Bank Stability (0-10)	9	5	6	4	6	6	6	9	9
9. Left Vegetative Protection (0-10)	6	8	8	8	8	8	6	9	9
9. Right Vegetative Protection (0-10)	6	8	8	8	8	8	6	9	9
10. Left Riparian Vegetative Zone Width (0-10)	9	9	9	9	2	1	8	10	10
10. Right Riparian Vegetative Zone Width (0-10)	9	9	9	9	5	1	8	10	10
Habitat Assessment Value (0-200)	126	132	94	79	99	101	140	134	106
Average	117							120	

[1]P = Perennial, I = Intermittent, E = Ephemeral

Impact Habitat Assessment Values (HAVs); (March – May, 2006)

Stream Name	UT4 of Miller Creek	UT5 of Miller Creek	
Gradient	high	high	high
Station	15+00	12+50	23+50
Stream Classification[1]	E	P	I
1. Epifaunal Substrate/ Available Cover (0-20)	0	15	11
2. Embeddedness (0-20)	13	5	12
3. Velocity/Depth Regime (0-20)	0	13	10
4. Sediment Deposition (0-20)	18	16	16
5. Channel Flow Status (0-20)	0	12	9
6. Channel Alteration (0-20)	18	16	15
7. Frequency of Riffles (0-20)	0	9	8
8. Left Bank Stability (0-10)	9	6	8
8. Right Bank Stability (0-10)	9	3	8
9. Left Vegetative Protection (0-10)	8	6	8
9. Right Vegetative Protection (0-10)	8	6	8
10. Left Riparian Vegetative Zone Width (0-10)	9	8	2
10. Right Riparian Vegetative Zone Width (0-10)	9	8	2
Habitat Assessment Value (0-200)	101	123	117
Average		120	

[1]P = Perennial, I = Intermittent, E = Ephemeral

Impact Habitat Assessment Values (HAVs); (March – May, 2006)

Stream Name	UT to Stonecoal Branch
Gradient	high
Station	11+00
Stream Classification[1]	I
1. Epifaunal Substrate/ Available Cover (0-20)	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 (0-20)	11
8. Left Bank Stability (0-10)	9
8. Right Bank Stability (0-10)	9
9. Left Vegetative Protection (0-10)	9
9. Right Vegetative Protection (0-10)	9
10. Left Riparian Vegetative Zone Width (0-10)	9
10. Right Riparian Vegetative Zone Width (0-10)	9
Habitat Assessment Value (0-200)	124
Average	

[1]P = Perennial, I = Intermittent, E = Ephemeral

Mitigation Habitat Assessment Values (HAVs) (October, 2008)

	Enhancement	Restoration		Preservation								
Stream Name	Reach A, B1	Reach B2, C, D	Reach E	UT1 of Right Fork of Hell Creek		UT2 of Right Fork of Hell Creek			UT5 of Right Fork of Hell Creek	UT6 of Right Fork of Hell Creek	LUT1 of Right Fork of Hell Creek	LUT2 of Right Fork of Hell Creek
Gradient (high or low)	High	High	High	High		High			High	High	High	High
Stream Classification[1]	P	P	P	P	I	P	I	E	I	I	E	E
1. Epifaunal Substrate/ Available Cover (0-20)	14	14	14	3	4	16	14	0	7	12	0	0
2. Embeddedness (0-20)	13	13	13	4	5	16	14	11	5	4	9	10
3. Velocity/Depth Regime (0-20)	11	10	10	3	4	10	11	0	5	6	0	0
4. Sediment Deposition (0-20)	9	11	11	4	7	15	13	10	14	12	15	14
5. Channel Flow Status (0-20)	2	5	5	7	6	9	3	0	8	8	0	0
6. Channel Alteration (0-20)	12	3	3	8	12	16	16	15	16	17	17	16
7. Frequency of Riffles (or bends) (0-20)	5	5	5	7	7	9	7	0	7	6	0	0
8. Left Bank Stability (0-10)	6	6	4	4	7	7	8	7	8	5	8	8
8. Right Bank Stability (0-10)	7	4	6	5	7	7	8	7	8	5	8	8
9. Left Vegetative Protection (0-10)	6	6	4	7	9	6	6	6	7	6	8	8
9. Right Vegetative Protection (0-10)	7	4	6	7	9	6	6	6	7	6	8	8
10. Left Riparian Vegetative Zone Width (0-10)	8	2	1	8	9	9	9	9	5	4	10	10
10. Right Riparian Vegetative Zone Width (0-10)	9	2	6	8	9	9	9	9	5	4	10	10
Habitat Assessment Value (0-200)	109	85	88	75	95	135	124	80	102	95	93	92
Average by Mitigation Type	109	87		99								
Preservation Average by Flow Regime	Perennial	105		Intermittent		104			Ephemeral	88		

[1] P=perennial, I=Intermittent, E=ephemeral

Impact Percent Cover (Densiometer); (March, 2008)

	Veg Cover by Layer (%) (Densiometer)				
	Ruth Trace Branch-Impact Sites				
	RTB-T-P	RTB-P-P	RTB-P-I	UT15-RTB-P-E	UT1-UT17-RTB-P-I
	% Cover	% Cover	% Cover	% Cover	% Cover
By Bank					
Left Bank	92.4	95.3	99.4	94.4	97.1
Midstream	85.0	95.1	98.8	92.9	97.4
Right Bank	95.3	94.6	99.8	94.4	95.1

	Veg Cover by Layer (%) (Densiometer)						
	Right Fork of Conley Branch-Impact Sites						
	RFCB-T-P	RFCB-P-P	RFCB-P-I	RFCB-P-E	UT1-RFCB-T-P	UT1-RFCB-P-I	UT2-RFCB-T-I
	% Cover	% Cover	% Cover	% Cover	% Cover	% Cover	% Cover
By Bank							
Left Bank	99.1	97.4	97.4	99.1	97.4	98.5	99.7
Midstream	98.5	96.8	93.8	97.6	97.6	95.3	99.7
Right Bank	98.0	100.0	97.8	99.0	95.8	97.8	99.8

	Veg Cover by Layer (%) (Densiometer)	
	Left Fork of Conley Branch-Impact Sites	
	LFCB-T-I	LFCB-P-I
	% Cover	% Cover
By Bank		
Left Bank	99.1	97.9
Midstream	98.5	97.9
Right Bank	97.8	95.8

Impact Percent Cover (Densiometer); (March, 2008)

	Veg Cover by Layer (%) (Densiometer)					
	Left Fork of Hell Creek-Impact Sites					
	LFHC-T-P	LFHC-T-P 2	LFHC-P-P	LFHC-P-I	UT1-LFHC-T-P	UT1-LFHC-P-P
	% Cover	% Cover	% Cover	% Cover	% Cover	% Cover
By Bank						
Left Bank	92.9	99.4	99.1	95.6	98.2	99.1
Midstream	95.6	97.9	97.6	97.1	98.8	97.6
Right Bank	95.8	98.5	98.5	99.3	99.8	98.5
	UT1-LFHC-P-I	UT2-UT1-LFHC-P-I	UT4-UT1-LFHC-P-E	UT10-LFHC	UT1-UT10-LFHC-P-I	UT1-UT1-UT10-LFHC-P-I
	% Cover	% Cover	% Cover	% Cover	% Cover	% Cover
By Bank						
Left Bank	98.8	99.4	99.7	100.0	100.0	99.7
Midstream	97.9	100.0	100.0	98.8	99.4	100.0
Right Bank	98.0	99.5	99.5	99.8	99.5	99.3

	Veg Cover by Layer (%) (Densiometer)					
	Right Fork of Hell Creek-Impact Sites					
	RFHC-T1 Down	RFHC-T2 Up	RFHC-P-I	RFHC-P-E	UT1-RFHC-P-I	UT1-RFHC-T-P
	% Cover	% Cover	% Cover	% Cover	% Cover	% Cover
By Bank						
Left Bank	97.2	90.9	98.8	98.2	92.9	97.9
Midstream	94.4	90.9	97.4	98.8	93.5	98.8
Right Bank	92.9	92.2	98.3	97.8	92.6	98.8
	UT1-RFHC-P-P	UT1-RFHC-P-E	UT6-UT1-RFHC-P-E	UT8-UT1-RFHC-P-E	UT4-RFHC	UT10-RFHC-P-I
	% Cover	% Cover	% Cover	% Cover	% Cover	% Cover
By Bank						
Left Bank	93.8	98.2	97.6	96.5	89.1	98.5
Midstream	90.3	96.5	98.2	94.7	87.4	95.9
Right Bank	91.7	95.8	98.0	95.3	87.7	98.0

Impact Percent Cover (Densiometer); (March, 2008)

	Veg Cover by Layer (%) (Densiometer)			
	Pigeonroost Creek-Impact Sites			
	PRC-T-P	PRC-P-I	UT1-UT1-PRC-T-E	UT5-PRC-P-I
	% Cover	% Cover	% Cover	% Cover
By Bank				
Left Bank	95.9	92.4	98.2	98.8
Midstream	91.2	91.8	98.5	92.6
Right Bank	96.3	91.4	98.0	90.4

	Veg Cover by Layer (%) (Densiometer)		
	Pigeon Creek-Impact Sites		
	UTPC-T-I	UTPC-P-I	UTPC-P-E
	% Cover	% Cover	% Cover
By Bank			
Left Bank	97.9	97.9	92.6
Midstream	97.6	96.8	94.7
Right Bank	97.5	97.8	96.8

	Veg Cover by Layer (%) (Densiometer)		
	Miller Creek-Impact Sites		
	UT5-MC-T-P	UT5-MC-P-P	UT5-MC-P-I
	% Cover	% Cover	% Cover
By Bank			
Left Bank	97.9	96.5	96.8
Midstream	96.5	90.9	97.1
Right Bank	99.0	91.7	96.8

Mitigation Percent Cover (Densiometer); (October, 2008)

	Mitigation Sites – Hell Creek			
	Reach A	Reach B1	Reach D	Reach E
	% Cover	% Cover	% Cover	% Cover
By Bank				
Left Bank	49.4	97.5	14.9	71
Midstream	66.8	99.6	11.3	93.3
Right Bank	73.7	99.2	19.5	99.8

Impact Vegetation by Height Summary (March, 2008)

	RTB-T-P				RTB-P-P				RTB-P-I				UT15-RTB-P-I				UT1-UT17-RTB-P-I			
	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil
By Bank																				
Left Bank	31.0	26.0	43.0	0.0	26.0	19.0	51.0	4.0	37.0	13.0	50.0	0.0	33.0	37.0	30.0	0.0	39.0	21.0	40.0	0.0
Right Bank	33.0	4.0	63.0	0.0	19.0	12.0	63.0	6.0	37.0	16.0	47.0	0.0	30.0	34.0	36.0	0.0	34.0	27.0	39.0	0.0
By Stream																				
All	32.0	17.0	51.0	0.0	23.0	16.0	56.0	5.0	37.0	15.0	48.0	0.0	32.0	35.0	33.0	0.0	36.0	24.0	40.0	0.0

	RFCB-P-I				RFCB-T-P				RFCB-P-E				RFCB-P-P				UT1-RFCB-T-P				UT1-RFCB-P-I				UT2-RFCB-T-I			
	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil
By Bank																												
Left Bank	39.0	13.0	47.0	1.0	40.0	12.0	47.0	1.0	26.0	30.0	43.0	1.0	39.0	18.0	42.0	1.0	32.0	21.0	47.0	0.0	30.0	33.0	37.0	0.0	42.0	8.0	50.0	0.0
Right Bank	37.0	13.0	49.0	1.0	35.0	18.0	46.0	1.0	33.0	28.0	38.0	1.0	37.0	15.0	47.0	1.0	35.0	28.0	37.0	0.0	33.0	27.0	40.0	0.0	37.0	17.0	46.0	0.0
By Stream																												
All	38.0	13.0	48.0	1.0	37.0	15.0	47.0	1.0	30.0	29.0	40.0	1.0	38.0	17.0	44.0	1.0	22.0	25.0	42.0	0.0	32.0	30.0	38.0	0.0	40.0	13.0	47.0	0.0

	LFCB-T-I				LFCB-P-I			
	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil
By Bank								
Left Bank	41.0	10.0	49.0	0.0	41.0	15.0	44.0	0.0
Right Bank	33.0	11.0	56.0	0.0	41.0	15.0	44.0	0.0
By Stream								
All	37.0	11.0	52.0	0.0	41.0	15.0	44.0	0.0

Impact Vegetation by Height Summary (March, 2008)

	RFHC-P-I				RFHC-P-E				RFHC-T1-Down				RFHC-T2-UP				UT1-RFHC-P-I				UT1-RFHC-P-E			
	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil
By Bank																								
Left Bank	36.0	19.0	44.0	1.0	40.0	16.0	44.0	0.0	30.0	20.0	49.0	1.0	26.0	18.0	56.0	0.0	26.0	34.0	40.0	0.0	27.0	34.0	39.0	0.0
Right Bank	36.0	11.0	53.0	0.0	37.0	15.0	48.0	0.0	24.0	18.0	58.0	0.0	19.0	25.0	55.0	1.0	29.0	28.0	43.0	0.0	32.0	30.0	38.0	0.0
By Stream																								
All	36.0	15.0	48.0	1.0	38.0	16.0	46.0	0.0	27.0	19.0	53.0	1.0	23.0	21.0	56.0	1.0	27.0	31.0	42.0	0.0	29.0	32.0	39.0	0.0

	UT1-RFHC-T-P				UT1-RFHC-P-P				UT4-RFHC-T-I				UT10-RFHC-P-I			
	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil
By Bank																
Left Bank	23.0	14.0	45.0	18.0	28.0	32.0	39.0	1.0	19.0	26.0	52.0	4.0	33.0	29.0	38.0	0.0
Right Bank	33.0	17.0	50.0	0.0	23.0	30.0	43.0	4.0	18.0	26.0	53.0	3.0	37.0	25.0	38.0	0.0
By Stream																
All	28.0	15.0	48.0	9.0	26.0	31.0	40.0	3.0	19.0	26.0	52.0	3.0	35.0	27.0	38.0	0.0

	LFHC-P-I				LFHC-P-P				LFHC-T-P1				LFHC-T-P2				UT1-LFHC-P-I				UT1-LFHC-T-P				UT1-LFHC-P-P			
	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil
By Bank																												
Left Bank	38.0	15.0	47.0	0.0	41.0	19.0	40.0	0.0	35.0	17.0	48.0	0.0	34.0	26.0	40.0	0.0	34.0	9.0	57.0	0.0	35.0	14.0	51.0	0.0	35.0	14.0	51.0	0.0
Right Bank	34.0	29.0	37.0	0.0	35.0	23.0	42.0	0.0	32.0	20.0	48.0	0.0	30.0	26.0	44.0	0.0	41.0	2.0	57.0	0.0	36.0	5.0	59.0	0.0	37.0	13.0	50.0	0.0
By Stream																												
All	36.0	23.0	41.0	0.0	38.0	21.0	41.0	0.0	34.0	18.0	48.0	0.0	32.0	26.0	42.0	0.0	37.0	6.0	57.0	0.0	35.0	10.0	55.0	0.0	36.0	14.0	50.0	0.0

Impact Vegetation by Height Summary (March, 2008)

	UT2-UT1-LFHC-P-I				UT1-UT10-LFHC-P-I				UT1-UT1-UT10-LFHC-P-I			
	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil
By Bank												
Left Bank	39.0	18.0	43.0	0.0	35.0	27.0	38.0	0.0	31.0	22.0	47.0	0.0
Right Bank	37.0	21.0	42.0	0.0	32.0	28.0	40.0	0.0	29.0	30.0	41.0	0.0
By Stream												
All	38.0	19.0	43.0	0.0	34.0	27.0	39.0	0.0	30.0	26.0	44.0	0.0

	PRC-P-I				PRC-T-P				UT1-UT1-PRC-T-E				UT5-PRC-P-I			
	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil
By Bank																
Left Bank	40.0	10.0	50.0	0.0	26.0	27.0	43.0	0.0	35.0	26.0	39.0	0.0	32.0	19.0	49.0	0.0
Right Bank	33.0	13.0	50.0	4.0	33.0	18.0	49.0	0.0	38.0	20.0	42.0	0.0	35.0	14.0	51.0	0.0
By Stream																
All	36.0	11.0	51.0	2.0	32.0	22.0	46.0	0.0	37.0	23.0	40.0	0.0	33.0	17.0	50.0	0.0

	UTPC-P-E				UTPC-P-I				UTPC-T-I			
	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil
By Bank												
Left Bank	40.0	18.0	42.0	0.0	35.0	28.0	37.0	0.0	33.0	24.0	43.0	0.0
Right Bank	40.0	19.0	41.0	0.0	60.0	4.0	28.0	8.0	36.0	20.0	44.0	0.0
By Stream												
All	40.0	28.0	42.0	0.0	44.0	19.0	34.0	3.0	34.0	22.0	44.0	0.0

Mitigation Vegetation by Height Summary (October, 2008)

	Hell Creek Reach A				Hell Creek Reach B1				Hell Creek Reach D				Hell Creek Reach E			
	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil	Herbs	Shrubs	Trees	Bare Soil
By Bank																
Left Bank	48.8	4.9	13.6	32.7	44.2	4.8	51	0	66	0	15.3	18.7	23	0	42.3	34.7
Right Bank	39.6	9.6	42.2	8.5	30.5	4.1	65.5	0	45.1	0	9.7	45.1	31.9	3.3	64.8	0
By Reach																
All	43.1	7.9	31.5	17.6	37.5	4.4	58	0	55.8	0	12.6	31.6	27	1.5	52.5	19.1

Impact Large Woody Debris Summary; (March, 2008)

	Impact Sites														
	Ruth Trace Branch				UT3 of Ruth Trace Branch	UT8 of Ruth Trace Branch	UT10 of Ruth Trace Branch	UT12 of Ruth Trace Branch	UT13 of Ruth Trace Branch	UT15 of Ruth Trace Branch	UT17 of Ruth Trace Branch		UT1 of UT17 of Ruth Trace Branch	UT18 of Ruth Trace Branch	UT19 of Ruth Trace Branch
	Reach 1	Reach 2	Reach 3	Reach 4	Reach 1	Reach 1	Reach 1	Reach 1	Reach 1	Reach 1	Reach 1	Reach 2	Reach 1	Reach 1	Reach 1
Pieces															
Length/Bankfull width	82	179	85	146	47	65	0	38	25	139	64	34	63	109	0
Diameter	35	103	51	63	15	22	0	14	6	38	27	9	23	55	0
Location	87	158	65	88	25	28	0	19	7	73	46	17	46	55	0
Type	82	153	65	88	25	28	0	19	7	73	46	17	46	55	0
Structure	26	78	31	43	16	13	0	8	5	29	18	7	14	28	0
Stability	58	174	83	121	34	41	0	32	17	99	58	21	52	82	0
Orientation	79	179	70	126	35	45	0	34	21	92	61	24	58	69	0
Piece Score	449	1024	450	675	197	242	0	164	88	543	320	129	302	453	0
Debris dams															
Length (% of bankfull width)	6	31	10	8	20	4	0	0	5	3	6	0	10	5	5
Height (% of bankfull depth)	7	30	10	8	18	4	0	0	5	3	6	0	10	5	5
Structure	3	45	13	4	22	5	0	0	5	13	4	0	8	5	3
Location	13	64	19	7	26	5	0	0	2	15	7	0	10	5	5
Stability	7	51	17	6	26	5	0	0	5	9	8	0	8	5	5
Debris Dams Score (Multiplier of 5)	180	1105	345	165	560	115	0	0	110	215	155	0	230	125	115
Total LWDI Score	629	2129	795	840	757	357	0	164	198	758	475	129	532	578	115
Length of stream (linear feet)	5930				750	600	1685	300	272	970	1086		800	800	100
Piece Score / foot of stream	0.44				0.26	0.40	0.00	0.55	0.32	0.56	0.56		0.38	0.57	0.00
DDS / linear foot of stream	0.30				0.75	0.19	0.00	0.00	0.40	0.22	0.14		0.29	0.16	1.15
LWDI / Linear foot of stream	0.74				1.01	0.60	0.00	0.55	0.73	0.78	0.56		0.67	0.72	1.15
Pieces of LWD	141				10	13	0	8	5	29	21		14	22	0
Number of Debris Dams	27				6	1	0	0	1	3	2		2	1	1

Impact Large Woody Debris Summary; (March, 2008)

	Impact Sites															
	Right Fork of Conley Branch			UT1 of RFCB	UT1 of UT1 of RFCB	UT2 of UT1 of RFCB	UT2 of RFCB	UT3 of RFCB	UT4 of RFCB	UT5 of RFCB	Left Fork of Conley Branch			UT of Stonecoal Branch	UT4 of Miller Creek	UT5 of Miller Creek
	Reach 1	Reach 2	Reach 3	Reach 1	Reach 1	Reach 1	Reach 1	Reach 1	Reach 1	Reach 1	Reach 1	Reach 2	Reach 3	Reach 1	Reach 1	Reach 1
Pieces																
Length/Bankfull width	127	105	122	151	46	10	74	89	45	44	115	156	55	19	25	384
Diameter	64	48	48	72	15	2	42	31	15	15	56	64	25	14	5	119
Location	107	88	61	113	24	8	53	38	16	20	92	124	24	23	9	154
Type	107	88	61	114	24	9	53	38	17	20	94	123	24	20	9	154
Structure	42	34	33	41	10	2	27	19	9	11	40	50	14	12	5	106
Stability	110	106	119	119	36	6	49	43	29	39	96	114	40	16	19	330
Orientation	95	87	109	94	33	6	64	68	39	49	76	108	46	10	20	292
Piece Score	652	556	553	704	188	43	362	326	170	198	569	739	228	114	92	1539
Debris dams																
Length (% of bankfull width)	18	16	11	38	5	0	4	1	0	7	38	24	13	0	0	10
Height (% of bankfull depth)	19	18	11	35	5	0	3	1	0	7	38	29	13	0	0	17
Structure	23	17	18	36	1	0	3	3	0	8	39	31	13	0	0	16
Location	22	20	17	44	4	0	5	5	0	9	44	45	14	0	0	17
Stability	21	21	14	40	4	0	1	5	0	8	43	43	19	0	0	16
Debris Dams Score (Multiplier of 5)	515	460	355	965	95	0	80	75	0	195	1010	860	360	0	0	380
Total LWDI Score	1167	1016	908	1669	283	43	442	401	170	393	1579	1599	588	114	92	1919
Length of stream (linear feet)	3476			2390	438	135	1225	510	450	300	5700			1110	1612	2550
Piece Score / foot of stream	0.51			0.29	0.43	0.32	0.30	0.64	0.38	0.66	0.27			0.10	0.06	0.60
DDS / linear foot of stream	0.38			0.40	0.22	0.00	0.07	0.15	0.00	0.65	0.39			0.00	0.00	0.15
LWDI / Linear foot of stream	0.89			0.70	0.65	0.32	0.36	0.79	0.38	1.31	0.66			0.10	0.06	0.75
Pieces of LWD	90			37	10	2	18	19	9	12	78			6	5	78
Number of Debris Dams	14			10	1	0	1	1	0	2	27			0	0	4

Impact Large Woody Debris Summary; (March, 2008)

	Impact Sites											
	Right Fork of Hell Creek (RFHC)	UT1 of RFHC	UT10 of UT1 of RFHC	UT11 of UT1 of RFHC	UT4 of RFHC	UT1 of UT4 of RFHC	UT3 of UT4 of RFHC	UT5 of RFHC	UT6 of RFHC	UT7 of RFHC	UT10 of RFHC	UT11 of RFHC
	Reach 1	Reach 1	Reach 1	Reach 1	Reach 1	Reach 1	Reach 1	Reach 1	Reach 1	Reach 1	Reach 1	Reach 1
Pieces												
Length/Bankfull width	1371	438	32	269	315	164	44	38	111	56	78	97
Diameter	838	403	29	234	192	121	37	28	76	52	37	62
Location	1268	406	31	230	259	167	65	38	83	60	55	68
Type	1338	389	30	272	307	170	80	40	104	82	55	74
Structure	681	281	22	170	151	117	54	22	73	52	22	33
Stability	1637	465	38	196	301	223	90	56	131	122	64	95
Orientation	1255	438	18	270	324	178	72	37	110	106	46	66
Piece Score (PS)	8388	2820	200	1641	1849	1140	442	259	688	530	357	495
Debris dams												
Length (% of bankfull width)	104	73	12	24	35	39	17	15	10	8	5	14
Height (% of bankfull depth)	188	80	10	24	40	29	16	14	9	13	5	18
Structure	117	54	11	22	29	19	8	12	4	5	5	16
Location	143	70	11	28	33	35	15	16	8	4	5	18
Stability	169	68	13	26	43	31	16	12	6	7	3	14
Debris Dams Score (DDS) (Multiplier of 5)	3605	1725	285	620	900	765	360	345	185	185	115	400
Total LWDI Score	11993	4545	485	2261	2749	1905	802	604	873	715	472	895
Length of stream (Linear feet)	6256	3900	80	1080	1700	788	310	550	725	520	385	500
Piece score / Foot of stream	1.34	0.72	2.50	1.52	1.09	1.45	1.43	0.47	0.95	1.02	0.93	0.99
DDS / Linear foot of stream	0.58	0.44	3.56	0.57	0.53	0.97	1.16	0.63	0.26	0.36	0.30	0.80
LWDI / Linear foot of stream	1.92	1.17	6.06	2.09	1.62	2.42	2.59	1.10	1.20	1.38	1.23	1.79
Pieces of LWD	411	145	10	80	89	61	26	14	45	32	18	24
Number of debris dams	44	22	3	8	12	9	4	4	4	3	1	4

Impact Large Woody Debris Summary; (March, 2008)

	Impact Sites																	
	Left Fork of Hell Creek				UT1 of Left Fork of Hell Creek			UT2 of UT1 of LFHC	UT5 of UT1 of LFHC	UT8 of LFHC	UT9 of LFHC	UT10 of LFHC	UT1 of UT10 of LFHC	UT1 of UT1 of UT10 of LFHC	UT2 of UT10 of LFHC	UT11 of LFHC	UT12 of LFHC
	Reach 1	Reach 2	Reach 3	Reach 4	Reach 1	Reach 2	Reach 3	Reach 1	Reach 1	Reach 1	Reach 1	Reach 1	Reach 1	Reach 1	Reach 1	Reach 1	Reach 1
Pieces																		
Length/Bankfull width	114	125	106	149	62	168	120	34	74	5	13	873	139	63	34	128	0
Diameter	68	77	47	72	39	96	36	15	56	2	3	677	73	51	23	68	0
Location	86	117	71	92	83	144	91	29	76	7	6	802	113	73	35	78	0
Type	87	117	72	92	84	148	90	21	64	7	6	797	114	93	27	78	0
Structure	51	44	30	45	25	67	33	12	35	2	3	550	71	51	14	43	0
Stability	119	124	102	125	87	165	101	28	73	4	7	686	107	93	28	105	0
Orientation	115	119	84	116	74	152	101	30	64	5	8	689	103	79	29	89	0
Piece Score	640	723	512	691	454	940	572	169	442	32	46	5074	720	503	190	589	0
Debris dams																		
Length (% of bankfull width)	16	13	15	8	3	27	21	6	10	1	2	65	7	6	7	5	0
Height (% of bankfull depth)	22	16	15	7	3	30	17	2	8	2	2	70	11	14	6	10	0
Structure	28	15	11	5	9	35	36	6	4	3	3	59	7	8	6	12	0
Location	32	24	13	11	14	42	44	7	7	4	4	65	8	10	7	16	0
Stability	30	23	15	9	9	41	42	6	8	3	3	75	9	12	8	14	0
Debris Dams Score (Multiplier of 5)	640	455	345	200	190	875	800	135	185	65	70	1670	210	250	170	285	0
Total LWDI Score	1280	1178	857	891	644	1815	1372	304	627	97	116	6744	930	753	360	874	0
Length of stream (linear feet)	6600				3800			300	200	488	757	2960	566	337	360	1000	305
Piece Score / foot of stream	0.39				0.52			0.56	2.21	0.07	0.06	1.71	1.27	1.49	0.53	0.59	0.00
DDS / linear foot of stream	0.25				0.49			0.45	0.93	0.13	0.09	0.56	0.37	0.74	0.47	0.29	0.00
LWDI / Linear foot of stream	0.64				1.01			1.01	3.14	0.20	0.15	2.28	1.64	2.23	1.00	0.87	0.00
Pieces of LWD	131				68			8	19	2	3	244	35	25	8	27	0
Number of Debris Dams	22				26			2	2	1	1	22	3	4	2	4	0

Impact Large Woody Debris Summary; (March, 2008)

	Impact Sites															
	Unnamed Tributary of Pigeon Creek			UT6 of UTPC		Pigeon Roost Creek				UT1 of UT1 of PRC	UT2 of PRC	UT3 of PRC	UT5 of PRC		UT6 of PRC	LFPRC
	Reach 1	Reach 2	Reach 3	Reach 1	Reach 2	Reach 1	Reach 2	Reach 3	Reach 4	Reach 1	Reach 1	Reach 1	Reach 1	Reach 2	Reach 1	Reach 1
Pieces																
Length/Bankfull width	116	129	10	74	14	192	81	99	69	4	10	20	98	162	41	21
Diameter	67	56	3	18	3	105	46	47	16	1	2	6	46	71	9	9
Location	89	65	6	33	8	173	69	83	39	3	2	7	73	103	17	14
Type	83	65	6	33	8	170	69	83	40	3	2	7	74	103	17	13
Structure	38	32	2	20	3	64	29	32	15	1	2	4	29	49	9	9
Stability	112	100	6	40	9	160	69	88	41	3	8	16	79	135	31	19
Orientation	119	116	10	56	11	149	86	112	48	3	10	16	95	140	38	21
Piece Score	624	563	43	274	56	1013	449	544	268	18	36	76	494	763	162	106
Debris dams																
Length (% of bankfull width)	15	15	0	6	1	25	37	37	1	0	0	0	28	23	0	4
Height (% of bankfull depth)	8	9	0	3	2	26	39	37	1	0	0	0	28	26	0	3
Structure	10	5	0	8	3	31	39	30	1	0	0	0	31	30	0	6
Location	20	15	0	8	5	40	42	44	4	0	0	0	33	33	0	4
Stability	10	11	0	8	3	41	41	48	3	0	0	0	33	36	0	4
Debris Dams Score (Multiplier of 5)	315	275	0	165	70	815	990	980	50	0	0	0	765	740	0	105
Total LWDI Score	939	838	43	439	126	1828	1439	1524	318	18	36	76	1259	1503	162	211
Length of stream (linear feet)	4782			950		4340				710	1110	190	1900		250	450
Piece Score / foot of stream	0.26			0.35		0.52				0.03	0.03	0.40	0.66		0.65	0.24
DDS / linear foot of stream	0.12			0.25		0.65				0.00	0.00	0.00	0.79		0.00	0.23
LWDI / Linear foot of stream	0.38			0.59		1.18				0.03	0.03	0.40	1.45		0.65	0.47
Pieces of LWD	66			19		122				1	4	2	66		9	5
Number of Debris Dams	7			3		29				0	0	0	15		0	2

Mitigation Large Woody Debris Summary; (October, 2008)

	Mitigation Sites		
	Enhancement	**Restoration**	**Preservation**
Assessed Lengths (linear feet)	4,943	4,642	8,071
Pieces of LWD	**9**	**3**	**398**
Length/Bankfull width	38	13	1308
Diameter	33	12	1123
Location	30	12	1147
Type	29	9	1144
Structure	27	5	781
Stability	29	7	1329
Orientation	27	9	1199
Piece Score (PS)	**213**	**67**	**8,031**
PS / ft	**0.04**	**0.01**	**1.00**
Number of debris dams	**0**	**0**	**50**
Length (% of bankfull width)	0	0	171
Height (% of bankfull depth)	0	0	179
Structure	0	0	124
Location	0	0	171
Stability	0	0	162
Debris Dams Score (DDS) (Multiplier of 5)	**0**	**0**	**4,035**
DDS / ft	**0.00**	**0.00**	**0.50**
Total LWDI Score	**213**	**67**	**12,066**
LWDI / ft	**0.04**	**0.01**	**1.49**

Impact Benthic Macroinvertebrate Metric Summary; (March – May, 2006)

Site	RTB-1	RTB-2	CB-1	CB-2	CB-3	CB-4	CB-5	CB-6	LFCB-1	LFCB-2
Summary Metrics										
Total Number of Individuals	180	178	148	113	147	43	61	26	46	14
Total Number of Taxa	18	12	10	13	16	13	9	10	12	10
Total Number EPT Taxa	11	10	4	7	12	10	7	7	7	7
Percent EPT	86	96	52	68	89	91	90	77	80	71
Percent Ephemeroptera	67	78	13	46	63	33	77	46	54	29
Percent Plecoptera	10	7	0	7	17	35	10	8	9	36
Percent Chironomidae	3	0	39	21	3	2	0	4	2	14
Percent 2 Dominant Taxa	46	52	72	53	56	37	49	31	41	29
HBI	2.9	2.4	5.0	3.5	1.8	2.4	2.5	3.1	3.2	3.5
Simpsons' Index	0.851	0.823	0.728	0.829	0.817	0.901	0.830	0.917	0.879	0.956
WV SCI Calculation										
Total Number of Taxa	86	57	48	62	76	62	43	48	57	48
Total Number EPT Taxa	85	77	31	54	92	77	54	54	54	54
Percent EPT	93	105	57	74	97	99	98	84	88	78
Percent Chironomidae	98	101	62	80	98	99	101	97	99	87
Percent 2 Dominant Taxa	85	75	43	73	68	98	79	108	92	112
HBI	100	107	71	91	115	107	105	97	96	92
Total Score - WV SCI	91	87	52	72	91	90	80	81	81	78

Impact Benthic Macroinvertebrate Metric Summary; (March – May, 2006)

Site	RFHC-1	RFHC-2	RFHC-3	RFHC-4	RFHC-5	RFHC-6	RFHC-7	LFHC-1	LFHC-2	LFHC-3	LFHC-4	LFHC-5	LFHC-6	LFHC-7
Summary Metrics														
Total Number of Individuals	63	70	144	74	137	133	81	89	25	59	81	46	55	57
Total Number of Taxa	15	8	16	17	18	19	17	10	9	13	14	14	15	17
Total Number EPT Taxa	8	6	12	12	13	12	10	5	8	11	10	11	11	12
Percent EPT	81	79	90	92	66	89	77	70	84	90	95	83	89	60
Percent Ephemeroptera	41	54	55	50	41	68	40	11	52	64	65	43	42	35
Percent Plecoptera	32	24	6	14	14	7	11	2	12	14	5	9	4	14
Percent Chironomidae	3	0	0	0	12	2	1	11	0	0	0	0	0	14
Percent 2 Dominant Taxa	43	41	49	43	37	56	40	66	52	44	43	37	49	30
HBI	2.6	3.2	3.5	3.2	3.3	3.1	3.7	4.7	3.0	2.9	3.5	3.7	3.8	3.8
Simpson's Index	0.887	0.853	0.839	0.878	0.891	0.798	0.891	0.673	0.853	0.866	0.852	0.900	0.858	0.924
WV SCI Calculation														
Total Number of Taxa	71	38	76	81	86	90	81	48	43	62	67	67	71	81
Total Number EPT Taxa	62	46	92	92	100	92	77	38	62	85	77	85	85	92
Percent EPT	88	85	98	100	72	97	83	76	91	98	103	90	97	65
Percent Chironomidae	98	101	101	101	89	99	100	90	101	101	101	101	101	87
Percent 2 Dominant Taxa	89	92	80	89	98	68	95	53	75	87	89	99	80	110
HBI	104	95	91	96	94	97	89	74	99	99	91	89	87	88
Total Score - WV SCI	85	76	90	93	90	91	87	63	78	89	88	88	87	87

Impact Benthic Macroinvertebrate Metric Summary; (March – May, 2006)

Site	UTPC-1	UTPC-2	PRC-1	PRC-2	MC-3	MC-4
Summary Metrics						
Total Number of Individuals	54	77	232	158	50	44
Total Number of Taxa	13	15	25	18	16	13
Total Number EPT Taxa	9	11	15	13	10	8
Percent EPT	61	92	78	89	70	64
Percent Ephemeroptera	44	56	40	48	46	32
Percent Plecoptera	9	21	15	13	20	27
Percent Chironomidae	22	1	3	3	6	14
Percent 2 Dominant Taxa	56	100	28	43	40	34
HBI	3.3	2.3	3.4	3.0	2.8	2.7
Simpson's Index	0.828	0.874	0.915	0.877	0.904	0.899
WV SCI Calculation						
Total Number of Taxa	62	71	119	86	76	62
Total Number EPT Taxa	69	85	115	100	77	62
Percent EPT	66	100	85	97	76	69
Percent Chironomidae	79	99	98	98	95	87
Percent 2 Dominant Taxa	69	91	113	89	94	103
HBI	95	109	93	99	101	103
Total Score - WV SCI	73	93	104	95	86	81

Mitigation Benthic Macroinvertebrate Metric Summary (May, 2009)

Site	Reach A	Reach B1	Reach D	Reach E
Summary Metrics				
Simpson's Index	0.842	0.908	0.756	0.840
Total Number of Individuals	100	50	103	61
Total Number of Taxa	13	13	14	12
Total Number EPT Taxa	10	9	9	6
Percent EPT	78	70	49	46
Percent Ephemeroptera	62	32	42	41
Percent Shredder	1	8	3	7
Percent Chironomidae	11	14	42	23
Percent 2 Dominant Taxa	51	32	61	46
HBI	3.9	3.8	4.3	4.2
WV SCI Calculation				
Total Number of Taxa	62	62	67	57
Total Number EPT Taxa	77	69	69	46
Percent EPT	85	76	53	50
Percent Chironomidae	90	87	59	78
Percent 2 Dominant Taxa	77	106	61	85
HBI	85	87	80	82
Total Score - WV SCI	79	81	65	66

Impact Benthic Macroinvertebrate Individual Count Summary; (March – May, 2006)

ORDER	FAMILY	FUNCTIONAL FEEDING GROUP	Tolerance Value	RTB-1	RTB-2	CB-1	CB-2	CB-3	CB-4	CB-5	CB-6	LFCB-1	LFCB-2
Ephemeroptera	Ameletidae	Collector-gatherers	0	18	30		3	43	3	13	5	3	1
	Baetidae	Collector-gatherers	4	20	7			1					
	Ephemerellidae	Collector-gatherers	2	55	52	9	36	40	4	4	3	11	
	Ephemeridae	Collector-gatherers	4								3		2
	Heptageniidae	Scrapers	3	27	40	10	14	7		15	1	7	1
	Leptophlebiidae	Collector-gatherers	4	1					1				
	Siphlonuridae	Collector-gatherers	4		9				6	15		4	
Plecoptera	Capniidae	Shredders	3	2	1								
	Chloroperlidae	Predators	0	1	2			9	8			3	
	Leuctridae	Shredders	0				2	1	4				
	Peltoperlidae	Shredders	0	1					1	2			1
	Perlidae	Predators	3									1	2
	Perlodidae	Predators	2	14	10		6	14	2	4	2		2
Trichoptera	Glossosomatidae	Scrapers	1					2					
	Hydropsychidae	Collector-filterers	5	12	17	50	13	10	8		3	8	1
	Limnephilidae	Shredders	4			8	3	1		2	3		
	Odontoceridae	Scrapers	0					2					
	Philopotamidae	Collector-filterers	4		3								
	Polycentropodidae	Predators	6	3				1					
	Rhyacophilidae	Predators	1						2				
Diptera	Ceratopogonidae	Predators	6	1			1		1				
	Chironomidae	Collector-gatherers	6	5		57	24	5	1		1	1	2
	Dixidae	Collector-filterers	1					2					
	Empididae	Predators	6			3							
	Simuliidae	Collector-filterers	6									3	
	Tabanidae	Predators	5										1
	Tipulidae	Shredders	4	10	4	7	7	7	2	5	2	3	
Coleoptera	Elmidae	Scrapers	5	2						1			
	Hydrophilidae	Predators	5	1									
	Psephenidae	Scrapers	4	2			1						
Odonata	Aeshnidae	Predators	5				2						
	Gomphidae	Predators	4									1	
	Libellulidae	Predators	2				1						
Megaloptera	Corydalidae	Predators	0		3	1							
Decapoda	Cambaridae	Collector-gatherers	6	5		1		2				1	1
Tubificida	Undetermined Order	Collector-gatherers	5			2					3		
Totals				180	178	148	113	147	43	61	26	46	14

Impact Benthic Macroinvertebrate Individual Count Summary; (March – May, 2006)

ORDER	FAMILY	FUNCTIONAL FEEDING GROUP	Tolerance Value	RFHC-1	RFHC-2	RFHC-3	RFHC-4	RFHC-5	RFHC-6	RFHC-7
Ephemeroptera	Ameletidae	Collector-gatherers	0			1				
	Baetidae	Collector-gatherers	4			3	3	1	2	1
	Ephemerellidae	Collector-gatherers	2	14	16	32	19	30	52	8
	Ephemeridae	Collector-gatherers	4	3					1	
	Heptageniidae	Scrapers	3	7	11	16	8	10	8	4
	Leptophlebiidae	Collector-gatherers	4		1	3	1		4	1
	Siphlonuridae	Collector-gatherers	4	2	10	24	6	15	23	18
Plecoptera	Capniidae	Shredders	3					6		
	Chloroperlidae	Predators	0	13	4	6	7	8	4	6
	Leuctridae	Shredders	0					3		
	Peltoperlidae	Shredders	0			1		1	1	
	Perlidae	Predators	3	3	13	2	2	1	4	3
	Perlodidae	Predators	2	4			1			
Trichoptera	Hydropsychidae	Collector-filterers	5	5		38	13	2	17	14
	Lepidostomatidae	Shredders	1					3		
	Leptoceridae	Predators	4			2	5			3
	Limnephilidae	Shredders	4					10		
	Polycentropodidae	Predators	6			2	2	1	1	4
	Rhyacophilidae	Predators	1				1		2	
Diptera	Ceratopogonidae	Predators	6			3	1	3		3
	Chironomidae	Collector-gatherers	6	2				16	3	1
	Dixidae	Collector-filterers	1							1
	Empididae	Predators	6	1						
	Tipulidae	Shredders	4	4	6	9	2	21	5	10
Coleoptera	Elmidae	Scrapers	5				1		1	
	Hydrophilidae	Predators	5						1	
	Psephenidae	Scrapers	4	2						1
Odonata	Gomphidae	Predators	4	1		1			1	1
Megaloptera	Corydalidae	Predators	0	1				2	1	2
Collembola	Isotomidae	Collector-gatherers	5			1	1			
Decapoda	Cambaridae	Collector-gatherers	6	1	9		1	4	2	
Totals				63	70	144	74	137	133	81

Impact Benthic Macroinvertebrate Individual Count Summary; (March – May, 2006)

ORDER	FAMILY	FUNCTIONAL FEEDING GROUP	Tolerance Value	LFHC-1	LFHC-2	LFHC-3	LFHC-4	LFHC-5	LFHC-6	LFHC-7
Ephemeroptera	Ameletidae	Collector-gatherers	0			2				
	Ephemerellidae	Collector-gatherers	2	4	6	10	14	7	10	4
	Ephemeridae	Collector-gatherers	4				2	1	2	2
	Heptageniidae	Scrapers	3	6	7	16	13	8	3	6
	Leptophlebiidae	Collector-gatherers	4			1	4		2	1
	Siphlonuridae	Collector-gatherers	4			9	20	4	6	7
Plecoptera	Capniidae	Shredders	3			2				
	Chloroperlidae	Predators	0			4	4	2	1	3
	Leuctridae	Shredders	0		1					2
	Peltoperlidae	Shredders	0		1			1		2
	Perlidae	Predators	3			1		1		1
	Perlodidae	Predators	2	2	1	1			1	
Trichoptera	Hydropsychidae	Collector-filterers	5	49	2	2	15	9	17	2
	Leptoceridae	Predators	4		2	5	1	1	2	3
	Limnephilidae	Shredders	4	1				1		
	Polycentropodidae	Predators	6		1		3	3	4	1
	Rhyacophilidae	Predators	1				1		1	
Diptera	Athericidae	Predators	4					2		1
	Chironomidae	Collector-gatherers	6	10						8
	Tipulidae	Shredders	4	6	4	5	1	4	3	9
Coleoptera	Elmidae	Scrapers	5	1			1			1
	Hydrophilidae	Predators	5			1	1			
	Psephenidae	Scrapers	4				1		1	
Megaloptera	Corydalidae	Predators	0						1	
Decapoda	Cambaridae	Collector-gatherers	6	3				2	1	4
Tubificida	Undetermined Order	Collector-gatherers	5	7						
Totals				89	25	59	81	46	55	57

Impact Benthic Macroinvertebrate Individual Count Summary; (March – May, 2006)

ORDER	FAMILY	FUNCTIONAL FEEDING GROUP	Tolerance Value	UTPC-1	UTPC-2	PRC-1	PRC-2	MC-3	MC-4
Ephemeroptera	Ameletidae	Collector-gatherers	0	4	10		19	9	8
	Baetidae	Collector-gatherers	4			9	7		
	Ephemerellidae	Collector-gatherers	2	18	22	19	35	11	5
	Heptageniidae	Scrapers	3	2	9	40	12	1	
	Leptophlebiidae	Collector-gatherers	4			2	1	2	
	Siphlonuridae	Collector-gatherers	4		2	23	2		1
Plecoptera	Capniidae	Shredders	3			1		3	
	Chloroperlidae	Predators	0		6	23			4
	Leuctridae	Shredders	0	1	4	5		2	
	Peltoperlidae	Shredders	0	2	3		4		1
	Perlidae	Predators	3	1		1		1	
	Perlodidae	Predators	2	1	3	4	13	4	7
	Taeniopterygidae	Shredders	2				3		
Trichoptera	Brachycentridae	Shredders	2						1
	Hydropsychidae	Collector-filterers	5		7	24	33	1	
	Leptoceridae	Predators	4			21			
	Limnephilidae	Shredders	4	3	4	1	2	1	
	Odontoceridae	Scrapers	0				6		
	Philopotamidae	Collector-filterers	4						1
	Polycentropodidae	Predators	6	1	1	6	4		
	Rhyacophilidae	Predators	1			3			
Diptera	Athericidae	Predators	4	1					
	Ceratopogonidae	Predators	6		1	1		2	1
	Chironomidae	Collector-gatherers	6	12	1	6	5	3	6
	Empididae	Predators	6			1			
	Ephydridae	Shredders	6			1			
	Muscidae	Predators	6						1
	Simuliidae	Collector-filterers	6			6	3		
	Tanyderidae	Collector-gatherers	3			5			
	Tipulidae	Shredders	4	6	1	21	1	2	6
Coleoptera	Elmidae	Scrapers	5			6		5	
	Psephenidae	Scrapers	4				2		
Odonata	Gomphidae	Predators	4			2			
Megaloptera	Corydalidae	Predators	0			1			
Decapoda	Cambaridae	Collector-gatherers	6	2	3		6	2	2
Tubificida	Undetermined Order	Collector-gatherers	5					1	
Totals				54	77	232	158	50	44

Mitigation Benthic Macroinvertebrate Individual Count Summary (May, 2009)

ORDER	FAMILY	FUNCTIONAL FEEDING GROUP	Tolerance Value	Reach A	Reach B1	Reach D	Reach E
Ephemeroptera	Ameltidae	Collector-gatherer	0				
	Baetidae	Collector-gatherers	4			1	
	Ephemerellidae	Collector-gatherers	2	8	7	20	9
	Ephemeridae	Collector-gatherers	4	3	1	1	2
	Heptageniidae	Scrapers	3	24	3	19	14
	Siphlonuridae	Collector-gatherers	4	27	5	2	
Plecoptera	Chloroperlidae	Predators	0			1	1
	Nemouridae	Shredders	2				1
	Peltoperlidae	Shredders	0			1	
	Perlidae	Predators	3		9		
	Perlodidae	Predators	2	4	3		
Trichoptera	Glossosomatidae	Scrapers	1	2			
	Hydropsychidae	Collector-filterers	5	6	5	4	
	Lepidostomatidae	Shredders	1	1	1		
	Philopotamidae	Collector-filterers	4	2	1		1
	Polycentropodidae	Predators	6	1			
	Rhyacophilidae	Predators	1			1	
Diptera	Ceratopogonidae	Predators	6			3	
	Chironomidae	Collector-gatherers	6	11	7	43	14
	Tipulidae	Shredders	4		3	2	3
Coleoptera	Elmidae	Scrapers	5				
	Psephenidae	Scrapers	4		1	1	
Odonata	Calyopterygidae	Predators	6				1
	Gomphidae	Predators	4	1			4
Megaloptera	Corydalidae	Predators	0				1
Decapoda	Cambaridae	Collector-gatherers	6	10	4	4	10
Totals				100	50	103	66

Impact Fish Summary (June, 2009)

Stream Name/Station:	Pigeonroost Creek	Left Fork Hell Creek	Right Fork Hell Creek - Upstream	Right Fork Hell Creek - Downstream	Ruth Trace Branch
Shocking Time (s):	785	947	1,016	1,842	1,240
Shocking Distance (ft):	450	450	450	450	450
Habitat Type:	75% Riffles, 20% Pools, 0% Runs, 5% Snags	70% Riffle, 20% Pools, 5% Runs, 5% Snags	80% Riffle, 10% Pools, 5% Runs, 5% Snags	50% Riffle, 35% Pools, 10% Runs, 5% Snags	60% Riffle, 30% Pools, 5% Runs, 5% Snags
Ave. Stream Width (ft):	8	20	18	16	18
Min. Stream Width (ft):	4	5	5	5	5
Max. Stream Width (ft):	15	35	20	20	20
Species Richness (#):	1	2	2	2	2
Total Abundance (#):	34	56	30	413	105
Total Wet Biomass (g):	104	179	18	1,266	572
Standing Crop (lbs/ac):	1.38	0.95	0.11	8.44	3.39
% (#) Tolerant Individuals (T):	34	56	30	413	105
% (#) Intermediate Individuals (M):	0	0	0	0	0
% (#) Intolerant Individuals (I):	0	0	0	0	0
% (#) Not Classified (NC):	0	0	0	0	0
Catch Per Unit Effort (CPUE) (fish/mile):	399	657	352	4,846	1,232
Simpson's Diversity Index:	0.000	0.166	0.370	0.482	0.476
% Most Abundant Taxa (#):	100% Blacknose Dace (34)	91.1% Blacknose Dace (51)	76.7 % Blacknose Dace (23)	59.8% Blacknose Dace (247)	61.9% Blacknose Dace (65)
% 2nd Most Abundant Taxa (#):	N/A	8.9% Creek Chub, (5)	23.3% Creek Chub (7)	40.2% Creek Chub (166)	38.1%Creek Chub (40)

Mitigation Sites Fish Summary; (June, 2009)

Stream Name/Station:	Reach B1	Reach D	Reach E
Shocking Time (s):	1030	1515	1323
Shocking Distance (ft):	400	400	400
Habitat Type:	50% Riffles, 15% Pools, 30% Runs, 5% Snags	30% Riffles, 20% Pools, 30% Runs, 20% Snags	40% Riffles, 30% Pools, 20% Runs, 10% Snags
Ave. Stream Width (ft):	8	10	10
Max. Stream Width (ft):	10	12	11
Species Richness (#):	2	8	2
Total Abundance (#):	71	144	70
Total Wet Biomass (g):	169	1661.4	325
Standing Crop (lbs/ac):	2.54	19.93	3.89
% (#) Tolerant Individuals (T):	100 (71)	69 (48)	100 (70)
% (#) Intermediate Individuals (M):	0 (0)	49 (34)	0 (0)
% (#) Intolerant Individuals (I):	0 (0)	8 (6)	0 (0)
% (#) Not Classified (NC):	0 (0)	0 (0)	0 (0)
Catch Per Unit Effort (CPUE) (fish/mile):	937	1,901	924
Simpson's Diversity Index:	0.507	0.654	0.481
% Most Abundant Taxa (#):	51% Blacknose Dace (36)	44% Creek Chubs (63)	39% Creek Chubs (43)
% 2nd Most Abundant Taxa (#):	49% Creek Chubs (35)	39% Striped Shiner (56)	61% Blacknose Dace (27)

APPENDIX H

WATER QUALITY ASSESSMENT DATA

Summary of Water Quality Parameters and Range for Freshwater Organisms

Water Quality Parameter	Range for Freshwater Organisms	Source
pH	6 to 9	Stumm and Morgan 1996
Acidity	not available	
Alkalinity	10 to 400 mg/L	Jenkins et al. 1995
Conductivity	not available	
TDS	not available	
Sulfate	< 850 mg/L	Jenkins et al. 1995
Iron	< 1 mg/L	Jenkins et al. 1995
Manganese	< 1.0 mg/L	Heinen 1996; Jenkins et al. 1995
Dissolved Aluminum	< 0.750 mg	EPA 2006
Selenium	< 0.005 mg/L	EPA 1986
Total Suspended Solids	10 to 400 mg/L	Heinen 1996

Baseline Water Chemistry: Impact Sites

Site	RTB-1	RTB-2
Date	3/28/2006	3/28/2006
Field Measurements		
Temperature (C)	8.44	8.51
Dissolved Oxygen (mg/L)	10.01	10.36
pH	5.21	4.99
Specific Conductance (uS/cm)	41	41
Laboratory Analysis		
Acidity (mg/L)	<5	<5
Aluminum (Al) (mg/L)	0.17	0.34
Alkalinity (mg/L)	<5	<5
Dissolved Al (mg/L)	<0.02	<0.02
Iron (Fe) (mg/L)	0.18	0.44
Manganese (Mn) (mg/L)	0.007	0.015
Selenium (Se) (µg/L)	<0.001	<0.001
Sp. Conductance (uS/cm)	45	44
Sulfate (mg/L)	11	11
TDS (mg/L)	25	35
TSS (mg/L)	5	16

Baseline Water Chemistry: Impact Sites

Site	CB-1	CB-2	CB-3	CB-4	CB-5	CB-6	LFCB-1	LFCB-2
Date	3/24/2006	3/24/2006	3/28/2006	3/28/2006	3/23/06	3/23/06	3/23/2006	3/23/2006
Field Measurements								
Temperature (C)	5.17	5.02	7.32	7.85	7.52	7.45	5.47	5.86
Dissolved Oxygen (mg/L)	11.68	9.62	10.12	10.11	12.79	12.59	10.84	11.04
pH	6.45	6.08	5.65	5.95	5.3	5.24	6.83	6.51
Specific Conductance (uS/cm)	35	30	45	45	45	42	31	28
Laboratory Analysis								
Acidity (mg/L)	<5	<5	<5	<5	<5	<5	<5	<5
Aluminum (Al) (mg/L)	0.19	0.31	3.26	0.82	1.69	0.71	0.06	1.43
Alkalinity (mg/L)	12.9	10.7	5.9	6.3	5.3	5.2	<5	<5
Dissolved Al (mg/L)	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02
Iron (Fe) (mg/L)	0.36	0.64	5.3	1.11	2.28	1.18	0.08	2.53
Manganese (Mn) (mg/L)	0.023	0.057	0.314	0.076	0.081	0.048	0.004	0.113
Selenium (Se) (µg/L)	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	0.001
Sp. Conductance (uS/cm)	71	61	50	50	51	49	61	55
Sulfate (mg/L)	12	12	12	11	12	12	12	12
TDS (mg/L)	43	55	30	29	55	44	44	57
TSS (mg/L)	<5	9	<5	42	76	68	<5	58

Baseline Water Chemistry: Impact Sites

Site	RFHC-1	RFHC-2	RFHC-3	RFHC-4	RFHC-5	RFHC-6	RFHC-7
Date	3/17/2006	3/21/2006	3/22/2006	3/22/2006	3/22/2006	3/22/2006	3/22/2006
Field Measurements							
Temperature (C)	7.69	5.57	3.65	3.63	3.43	3.7	4.32
Dissolved Oxygen (mg/L)	11.32	13.11	14.45	13.83	14.33	9.36	11.34
pH	6.89	6.04	6.26	6.53	5.76	7.43	7.18
Specific Conductance (uS/cm)	49	115	144	165	44	35	24
Laboratory Analysis							
Acidity (mg/L)	<5	<5	<5	<5	<5	<5	<5
Aluminum (Al) (mg/L)	1.06	0.56	1.73	0.07	0.1	0.11	0.1
Alkalinity (mg/L)	10.7	21.4	31.9	36.9	<5	5.8	5.6
Dissolved Al (mg/L)	0.03	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Iron (Fe) (mg/L)	1.31	0.77	2.96	0.11	0.17	0.17	0.2
Manganese (Mn) (mg/L)	0.039	0.024	0.072	0.004	0.007	0.009	0.012
Selenium (Se) (µg/L)	<0.001	0.002	0.004	0.003	<0.001	<0.001	<0.001
Sp. Conductance (uS/cm)	92	121	149	171	48	72	49
Sulfate (mg/L)	17	25	34	39	12	12	12
TDS (mg/L)	62	77	81	97	27	45	21
TSS (mg/L)	31	23	103	7	12	<5	<5

Baseline Water Chemistry: Impact Sites

Site	LFHC-1	LFHC-2	LFHC-3	LFHC-4	LFHC-5	LFHC-6	LFHC-7
Date	3/17/2006	3/14/2006	3/15/2006	3/15/2006	3/15/2006	3/15/2006	3/14/2006
Field Measurements							
Temperature (C)	7.45	9.14	7.35	9.54	9.73	8.94	9.38
Dissolved Oxygen (mg/L)	11.15	11.04	11.39	10.65	10.5	10.4	10.92
pH	7.03	6.56	6.51	6.43	6.67	6.54	6.68
Specific Conductance (uS/cm)	34	25	25	27	30	26	41
Laboratory Analysis							
Acidity (mg/L)	<5	<5	<5	<5	<5	<5	<5
Aluminum (Al) (mg/L)	0.18	0.7	0.34	0.23	0.22	0.18	0.38
Alkalinity (mg/L)	7.8	<5	<5	<5	<5	<5	8.6
Dissolved Al (mg/L)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02
Iron (Fe) (mg/L)	0.2	0.97	0.4	0.29	0.3	0.2	0.46
Manganese (Mn) (mg/L)	0.008	0.032	0.017	0.011	0.015	0.007	0.015
Selenium (Se) (µg/L)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sp. Conductance (uS/cm)	66	46	47	47	49	47	73
Sulfate (mg/L)	14	11	12	12	13	12	16
TDS (mg/L)	34	44	30	31	17	31	53
TSS (mg/L)	6	28	17	7	14	15	12

Baseline Water Chemistry: Impact Sites

Site	UTPC-1	UTPC-2
Date	3/30/2006	3/30/2006
Field Measurements		
Temperature (C)	8.78	10.94
Dissolved Oxygen (mg/L)	10.18	9.91
pH	6.51	6.42
Specific Conductance (uS/cm)	29	23
Laboratory Analysis		
Acidity (mg/L)	<5	<5
Aluminum (Al) (mg/L)	0.11	0.16
Alkalinity (mg/L)	<5	<5
Dissolved Al (mg/L)	<0.02	<0.02
Iron (Fe) (mg/L)	0.09	0.16
Manganese (Mn) (mg/L)	0.004	0.007
Selenium (Se) (µg/L)	<0.001	<0.001
Sp. Conductance (uS/cm)	52	52
Sulfate (mg/L)	13	13
TDS (mg/L)	25	31
TSS (mg/L)	<5	<5

Baseline Water Chemistry: Impact Sites

Site	PRC-1	PRC-2
Date	3/29/2006	3/29/2006
Field Measurements		
Temperature (C)	6.86	7.71
Dissolved Oxygen (mg/L)	10.41	10.23
pH	6.38	6.36
Specific Conductance (uS/cm)	44	42
Laboratory Analysis		
Acidity (mg/L)	<5	<5
Aluminum (Al) (mg/L)	0.06	0.06
Alkalinity (mg/L)	<5	<5
Dissolved Al (mg/L)	<0.02	<0.02
Iron (Fe) (mg/L)	0.06	0.06
Manganese (Mn) (mg/L)	0.004	0.005
Selenium (Se) (µg/L)	<0.001	<0.001
Sp. Conductance (uS/cm)	48	46
Sulfate (mg/L)	13	13
TDS (mg/L)	30	19
TSS (mg/L)	<5	<5

Baseline Water Chemistry: Impact Sites

Site	MC-3 (UTMC-4)	MC-4 (UTMC-5)
Date	4/4/2006	4/4/2006
Field Measurements		
Temperature (C)	11.15	11.97
Dissolved Oxygen (mg/L)	9.26	9.63
pH	6.59	6.44
Specific Conductance (uS/cm)	43	45
Laboratory Analysis		
Acidity (mg/L)	<5	<5
Aluminum (Al) (mg/L)	1.04	0.79
Alkalinity (mg/L)	5.6	5
Dissolved Al (mg/L)	<0.02	<0.02
Iron (Fe) (mg/L)	2.12	1.56
Manganese (Mn) (mg/L)	0.098	0.082
Selenium (Se) (µg/L)	<0.001	<0.001
Sp. Conductance (uS/cm)	71	71
Sulfate (mg/L)	12	12
TDS (mg/L)	39	43
TSS (mg/L)	119	39

Baseline Water Chemistry: Mitigation Sites

Site	Reach A	Reach B1	Reach D	Reach E
Date	5/18/2009	5/18/2009	5/18/2009	5/18/2009
Field Measurements				
Temperature (C)	10.5	11.4	10.44	10.49
Dissolved Oxygen (mg/L)	11.2	11.15	11.17	10.89
pH	6.92	6.75	6.75	6.92
Specific Conductance (uS/cm)	172	129	115	108
Laboratory Analysis				
Acidity (mg/L)	<5	<5	<5	<5
Aluminum (Al) (mg/L)	0.08	0.19	0.11	0.008
Alkalinity (mg/L)	26	20	17	14
Dissolved Al (mg/L)	<0.02	<0.02	<0.02	<0.02
Iron (Fe) (mg/L)	0.14	0.38	0.17	0.13
Dissolved Iron (mg/L)	0.03	0.10	0.03	0.02
Manganese (Mn) (mg/L)	0.006	0.038	0.008	0.008
Dissolved Manganese (mg/L)	0.004	0.033	0.006	0.005
Magnesium (mg/L)	8.0	5.7	4.7	4.6
Selenium (Se) (µg/L)	0.0011	<0.0010	<0.0010	<0.0010
Sp. Conductance (uS/cm)	137	107	96	90
Sulfate (mg/L)	28	19	16	15
TDS (mg/L)	64	50	53	45
TSS (mg/L)	8	16	3	4
E. Coli (col/100 ml)	140	132	1000	80
Fecal Coliforms (col/100 ml)	34	46	273	53

PROJECT REFERENCE NO.	SHEET NO.
Buffalo Mtn. Surface Mine	0

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Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

12/18/2009

\\CharFil\Vol6\Projects\Mining\Mine Projects\Consol\Buffalo Mountain\CMP-On-Site Creation\Plan Views\Const\Const_sheet\0

Appendix I:

On-&Off-Site Establishment and On-Site Restoration, Conceptual Design Plan Sheets

12/18/2009

STATE	BAKER PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
WV	Buffalo Mtn. Surface Mine	1	12

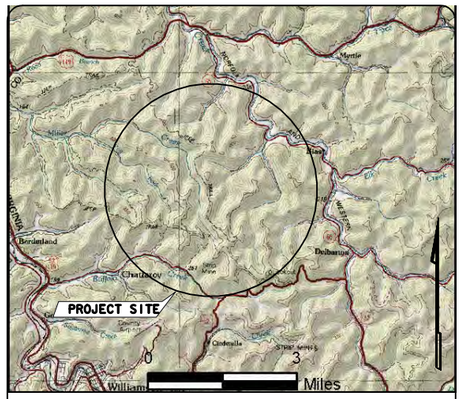
PROJECT: Buffalo Mountain Surface Mine

BUFFALO MTN. SURFACE MINE
CONSOL OF KENTUCKY INC.

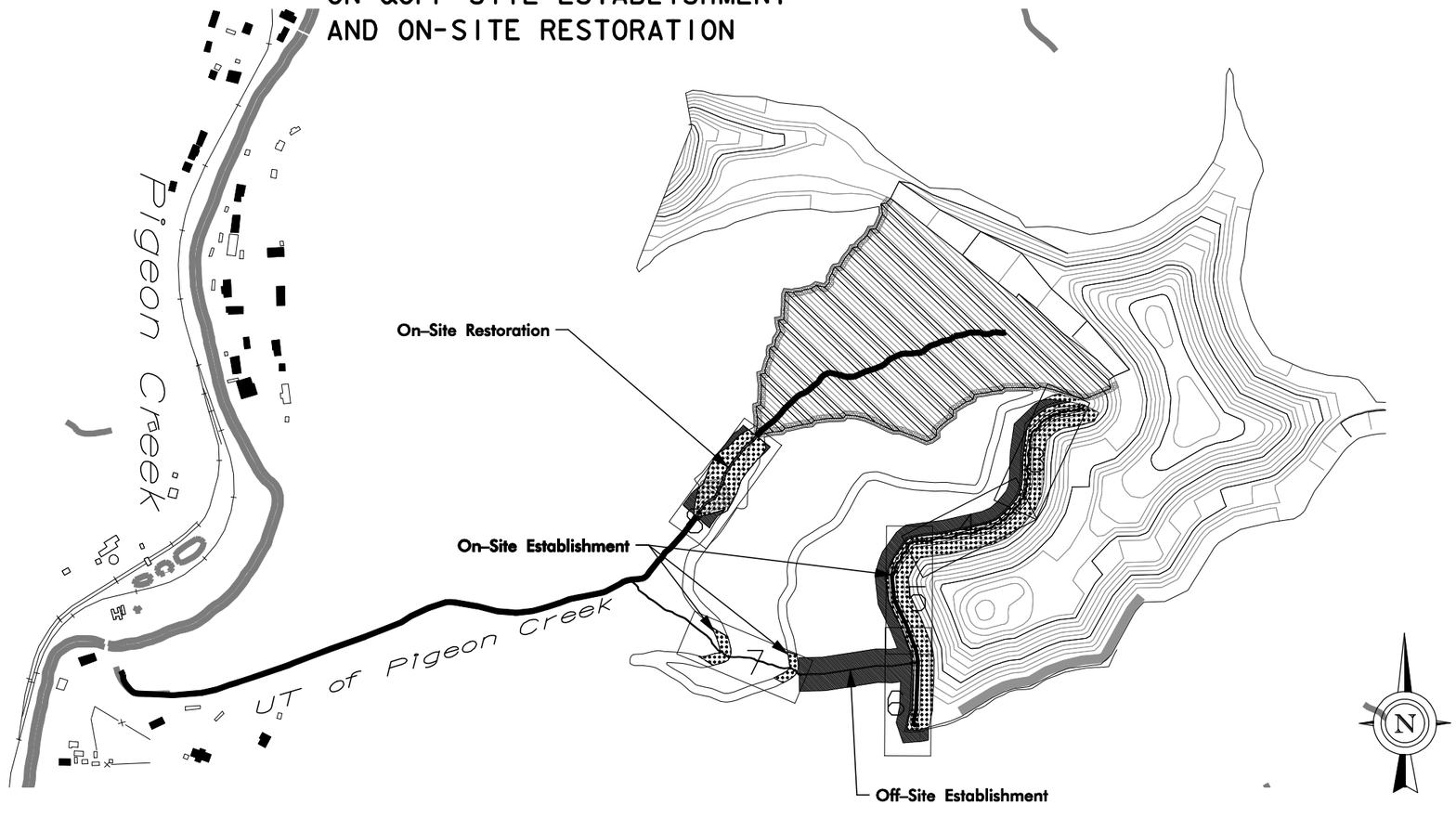
MINGO COUNTY

LOCATION: PIGEON CREEK AND MILLER CREEK WATERSHEDS

TYPE OF WORK: CONCEPTUAL DESIGN FOR ON-&OFF-SITE ESTABLISHMENT AND ON-SITE RESTORATION



VICINITY MAP



INDEX OF SHEETS

1	TITLE SHEET
1-A	STREAM CONVENTIONAL SYMBOLS AND VEGETATION SELECTION
2 TO 2-D	TYPICAL POOL AND RIFFLE CROSS SECTIONS, STRUCTURE DETAILS, AND GENERAL NOTES
3 TO 8	PLAN AND PROFILE VIEW OF PROPOSED AND EXISTING STREAM DESIGN
9 TO 12	CROSS SECTIONS

GRAPHIC SCALES

20 10 0 20 40
PLANS

20 10 0 20 40
PROFILE (HORIZONTAL)

2 1 0 2 4
PROFILE (VERTICAL)

NO.	DATE	BY	REVISION

PREPARED IN THE OFFICE OF:

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

PREPARED FOR THE OFFICE OF:
U.S. ARMY CORPS OF ENGINEERS
HUNTINGTON DISTRICT, REGULATORY BRANCH
502 EIGHTH STREET, HUNTINGTON, WV 25701

N/A
LETTING DATE:

PROJECT ENGINEER

C. MOWER / W. HARMAN
PROJECT DESIGNER

PROJECT ENGINEER

PRELIMINARY PLANS
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SIGNATURE: P.E.

PROJECT REFERENCE NO.	SHEET NO.
Buffalo Mtn. Surface Mine	I-A

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Phone: 304.769.0821
Fax: 304.769.0822

STREAM CONVENTIONAL SYMBOLS

- LOG STEP
- ROCK STEP POOL
- PLANTED VEGETATION
- PRESERVATION AREA
- SEDIMENT DITCH BREAKLINES
- BANKFULL CHANNEL
- STREAM CENTERLINE (2+00)
- JURISDICTIONAL CHANNEL

TEMPORARY SEEDING

The following table lists thetemporary seed mix for the project site. All disturbed areas will be stabilized using mulch and temporary seed.

Common Name	Rate	Dates
WINTER WHEAT	130 LBS/ACRE	NOVEMBER TO APRIL
WINTER OR PERENNIAL RYE	130 LBS/ACRE	NOVEMBER TO APRIL
BROWN TOP MILLET	40 LBS/ACRE	APRIL TO AUGUST

VEGETATION SELECTION

PERMANENT SEED MIXTURES FOR REVEGETATION

Floodplain and Buffer Areas						
Common Name	Species Name	Frequency	Density (lbs/acre)	Indicator	Strata	Size
Virginia wildrye	*Elymus virginicus*	25%	2	FAC	Grass	Seed
Switchgrass	*Panicum virgatum*	25%	3	FAC+	Grass	Seed
Fox sedge	*Carex vulpinoidea*	25%	3	OBL	Grass	Seed
Redtop	*Agrostis alba*	25%	2	FAC	Grass	Seed
Restored Streambanks						
Virginia wildrye	*Elymus virginicus*	30%	12	FAC	Grass	Seed
Switchgrass	*Panicum virgatum*	30%	3	FAC+	Grass	Seed
Soft rush	*Juncus effusus*	20%	2	FACW+	Grass	Seed
Deertongue	*Dichathelium Clandestinum*	20%	12	FACW	Grass	Seed
Alternate Species						
Rice Cutgrass	*Leersia oryzoides*			OBL	Grass	Seed
Wood Reed-Grass	*Cinna arundinacea*			FACW+	Grass	Seed

BARE-ROOT TREES SPECIES SELECTED FOR REVEGETATION OF THE ON-SITE MITIGATION AREAS

Stream Banks (Live Stakes)								
Common Name	Species Name	Minimum Spacing,	Frequency (%)	Density	Indicator	Strata	Spacing Type	Size
Silky dogwood	*Cornus obliqua*	2-3 ft apart	40%	65 to 100 stems per 1,000 SF	FACW	Tree	Random Triangular	2-3 feet long
Silky willow	*Salix sericea*	2-3 ft apart	40%	65 to 100 stems per 1,000 SF	OBL	Tree	Random Triangular	2-3 feet long
Elderberry	*Sambucus canadensis*	2-3 ft apart	20%	33 to 50 stems per 1,000 SF	FACW-	Tree	Random Triangular	2-3 feet long
Stream Riparian Buffer (Bare Root Trees)								
River birch	*Betula nigra*	8-10 ft apart	30%	140 stems per acre	FACW	Tree	Random Triangular	Seedling
Tulip poplar	*Liriodendron tulipifera*	8-10 ft apart	30%	140 stems per acre	FACU	Tree	Random Triangular	Seedling
American Beech	*Fagus grandifolia*	8-10 ft apart	20%	85 stems per acre	FACW-	Tree	Random Triangular	Seedling
Southern red oak	*Quercus rubra*	8-10 ft apart	20%	85 stems per acre	FACU-	Tree	Random Triangular	Seedling
Alternate Species								
Silky Cornel	*Cornus amomum*				FACW	Tree		
Black Willow	*Salix nigra*				FACW+	Tree		
Ninebark	*Physocarpus opulifolius*				FACW-	Tree		

PROJECT REFERENCE NO.	SHEET NO.
Buffalo Mtn. Surface Mine	2

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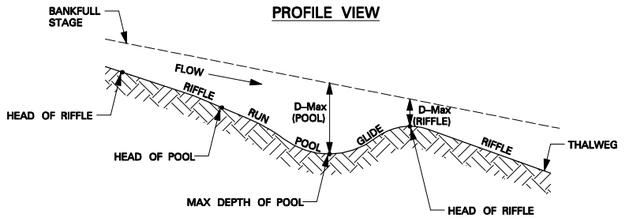
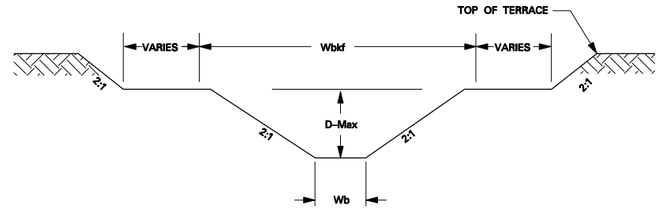
TYPICAL PROFILE FOR STEP POOL CHANNELS



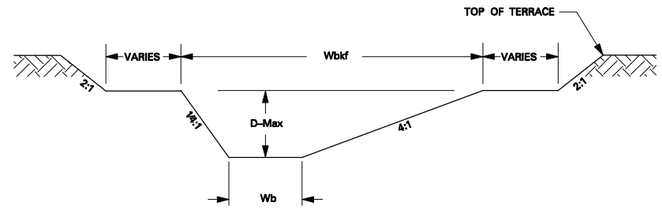
NOTES:

1. THE POINTS SHOWN, e.g. HEAD OF RIFFLE, HEAD OF POOL AND MAX DEPTH OF POOL ARE THE CONTROL POINTS USED TO CUT THE PROFILE; HOWEVER, THE CONTRACTOR SHOULD CREATE SMOOTH TRANSITIONS BETWEEN CONTROL POINTS AS SHOWN ABOVE.
2. USE THE FACET SLOPES IN THE TABLE AS A GUIDE TO ENSURE THAT THE FEATURES ARE APPROPRIATELY GRADED.
3. THE HEAD OF RIFFLE ELEVATION SHOULD NOT EXCEED THE HEAD OF POOL ELEVATION.
4. THE CHANGE IN WIDTH BETWEEN THE RIFFLES AND POOLS SHOULD OCCUR GRADUALLY OVER THE ENTIRE LENGTH OF THE BEND.

ON-SITE RESTORATION TYPICAL RIFFLE, POOL, AND BANKFULL BENCH CROSS SECTIONS



RIFFLE WITH BANKFULL BENCH

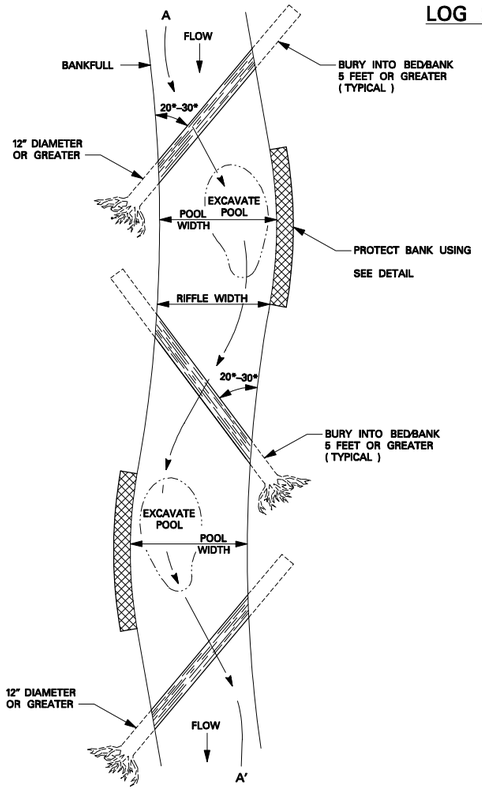


POOL WITH BANKFULL BENCH

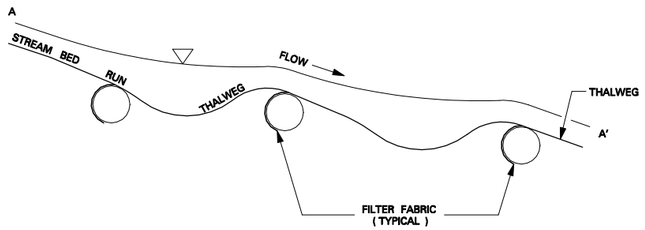
NOTES:

1. DURING CONSTRUCTION CORNERS OF DESIGN CHANNEL WILL BE ROUNDED AND A THALWEG WILL BE SHAPED PER DIRECTION OF ENGINEER.
2. POOLS SHOWN ABOVE ARE LEFT POOLS ONLY.

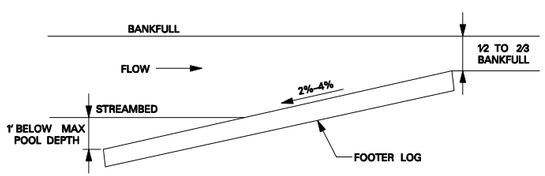
LOG STEP /POOL



PLAN VIEW



SECTION A – A'

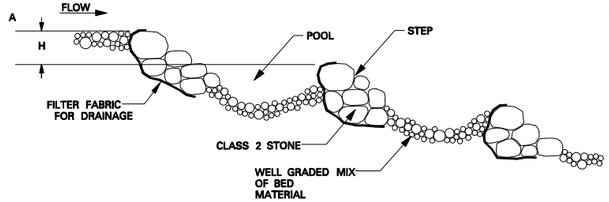


PROFILE VIEW

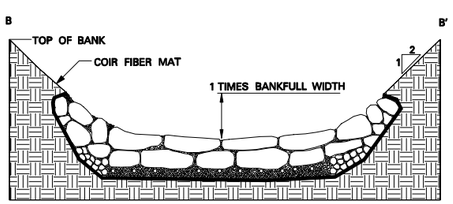
NOTES:

1. LOGS WITHOUT ROOT MASS MAY BE USED IF APPROVED BY PROJECT ENGINEER.

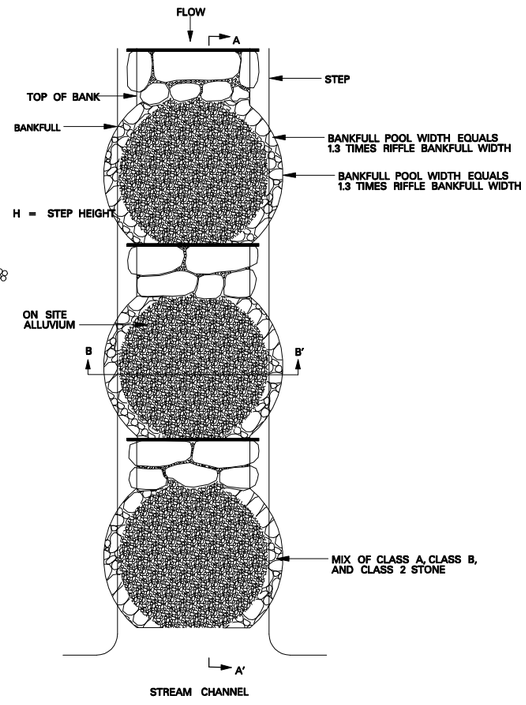
STEP POOL CHANNEL



PROFILE VIEW A–A'



CROSS SECTION B–B'



PLAN VIEW

PROJECT REFERENCE NO.	SHEET NO.
Buffalo Mtn. Surface Mine	2-A

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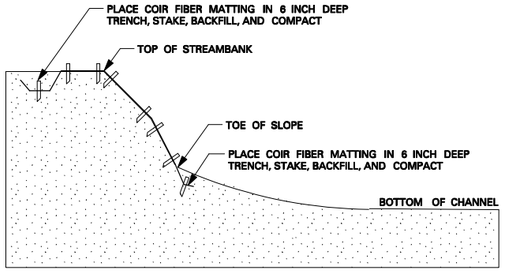
EROSION CONTROL MATTING



CROSS SECTION VIEW

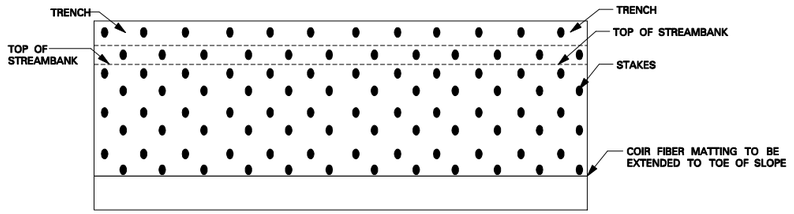
NOTES:

1. BANKS SHOULD BE SEEDED PRIOR TO PLACEMENT OF MATTING.
2. PLACE COIR FIBER MATTING ACCORDING TO MANUFACTURER RECOMMENDATIONS.
3. MATTING STAKES SHOULD BE PLACED IN A DIAMOND SHAPED PATTERN.

TYPICAL MATTING STAKE

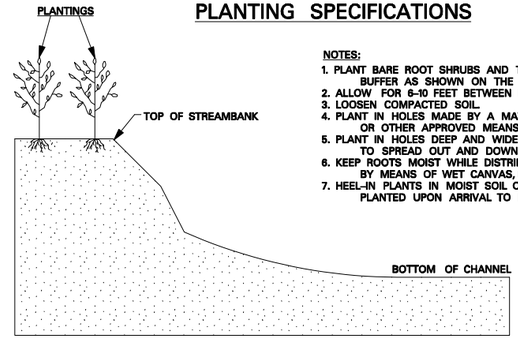
THE WOOD STAKE SHALL BE THE NORTH AMERICAN GREEN ECO-STAKE OR APPROVED EQUAL WITH THE FOLLOWING DIMENSIONS:

LEG LENGTH	11.00 IN (27.94 CM)
HEAD WIDTH	1.25 IN (3.18 CM)
HEAD THICKNESS	0.40 IN (1.02 CM)
LEG WIDTH	0.60 IN (1.52 CM) (TAPERED TO POINT)
LEG THICKNESS	0.40 IN (1.02 CM)
TOTAL LENGTH	12.00 IN (30.48 CM)



PLAN VIEW

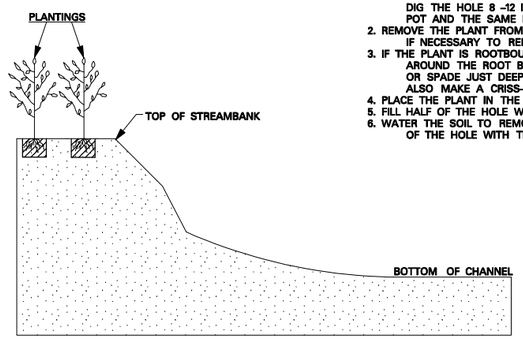
PLANTING SPECIFICATIONS



CROSS SECTION VIEW OF BARE ROOT PLANTING

NOTES:

1. PLANT BARE ROOT SHRUBS AND TREES TO THE WIDTH OF THE BUFFER AS SHOWN ON THE PLANS.
2. ALLOW FOR 6-10 FEET BETWEEN PLANTINGS, DEPENDING ON SIZE.
3. LOOSEN COMPACTED SOIL.
4. PLANT IN HOLES MADE BY A MATTOCK, DIBBLE, PLANTING BAR, OR OTHER APPROVED MEANS.
5. PLANT IN HOLES DEEP AND WIDE ENOUGH TO ALLOW THE ROOTS TO SPREAD OUT AND DOWN WITHOUT J-ROOTING.
6. KEEP ROOTS MOIST WHILE DISTRIBUTING OR WAITING TO PLANT BY MEANS OF WET CANVAS, BURLAP, OR STRAW.
7. HEEL-IN PLANTS IN MOIST SOIL OR SAWDUST IF NOT PROMPTLY PLANTED UPON ARRIVAL TO PROJECT SITE.

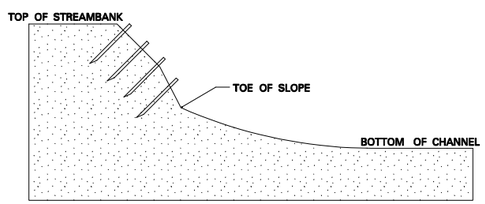


CROSS SECTION VIEW OF CONTAINER PLANTING

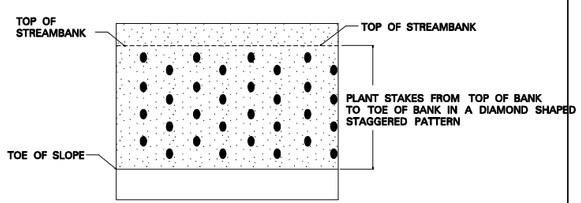
NOTES:

1. WHEN PREPARING THE HOLE FOR A POTTED PLANT OR SHRUB DIG THE HOLE 8 -12 INCHES LARGER THAN THE DIAMETER OF THE POT AND THE SAME DEPTH AS THE POT.
2. REMOVE THE PLANT FROM THE POT. LAY THE PLANT ON ITS SIDE IF NECESSARY TO REMOVE THE POT.
3. IF THE PLANT IS ROOTBOUND (ROOTS GROWING IN A SPIRAL AROUND THE ROOT BALL), MAKE VERTICAL CUTS WITH A KNIFE OR SPADE JUST DEEP ENOUGH TO CUT THE NET OF ROOTS. ALSO MAKE A CRISS-CROSS CUT ACROSS THE BOTTOM OF THE BALL.
4. PLACE THE PLANT IN THE HOLE.
5. FILL HALF OF THE HOLE WITH SOIL (SAME SOIL REMOVED FOR BACKFILL).
6. WATER THE SOIL TO REMOVE AIR POCKETS AND FILL THE REST OF THE HOLE WITH THE REMAINING SOIL.

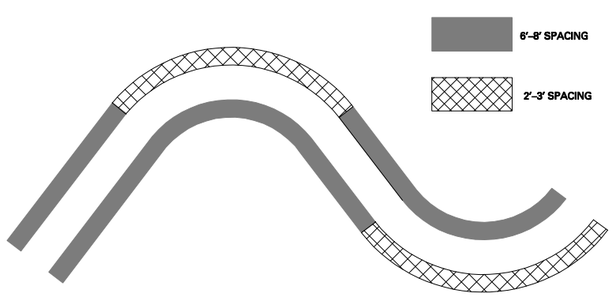
LIVE STAKING



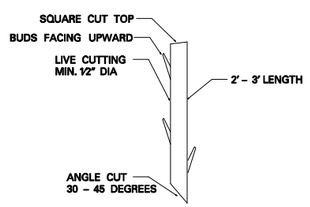
CROSS SECTION VIEW



PLAN VIEW



PLAN VIEW

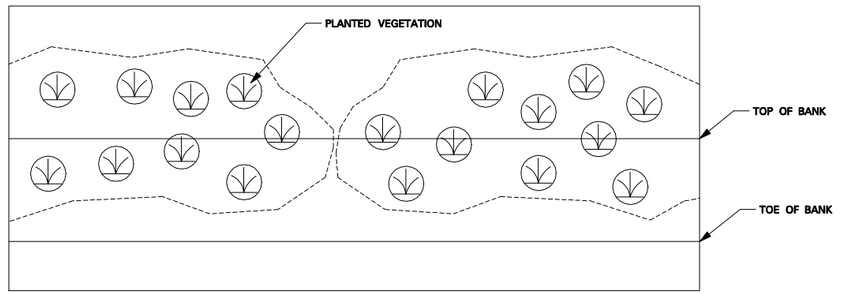


LIVE STAKE DETAIL

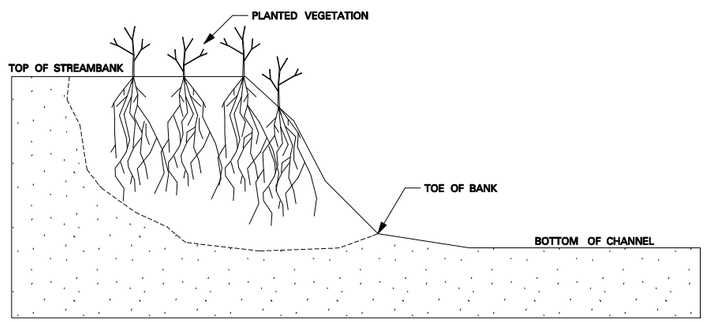
NOTES:

1. STAKES SHOULD BE CUT AND INSTALLED ON THE SAME DAY.
2. DO NOT INSTALL STAKES THAT HAVE BEEN SPLIT.
3. STAKES MUST BE INSTALLED WITH BUDS POINTING UPWARDS.
4. STAKES SHOULD BE INSTALLED PERPENDICULAR TO BANK.
5. STAKES SHOULD BE 1/2 TO 2 INCHES IN DIAMETER AND 2 TO 3 FT LONG.
6. STAKES SHOULD BE INSTALLED LEAVING 1/3 OF STAKE ABOVE GROUND.

PLANTED VEGETATION



PLAN VIEW



CROSS SECTION VIEW

NOTES:

1. EXCAVATE A HOLE IN THE BANK TO BE STABILIZED THAT WILL ACCOMMODATE THE SIZE OF TRANSPLANT TO BE PLACED. BEGIN EXCAVATION AT THE TOE OF THE BANK.
2. EXCAVATE TRANSPLANT USING A FRONT END LOADER. EXCAVATE THE ENTIRE ROOT MASS AND AS MUCH ADDITIONAL SOIL MATERIAL AS POSSIBLE. IF ENTIRE ROOT MASS CANNOT BE EXCAVATED IN ONE BUCKET LOAD, THE TRANSPLANT IS TOO LARGE AND ANOTHER SHOULD BE SELECTED.
3. PLACE TRANSPLANT IN THE BANK TO BE STABILIZED SO THAT VEGETATION IS ORIENTATED VERTICALLY.
4. FILL IN ANY HOLES AROUND THE TRANSPLANT AND COMPACT.
5. ANY LOOSE SOIL LEFT IN THE STREAM SHOULD BE REMOVED.
6. PLACE MULTIPLE TRANSPLANTS CLOSE TOGETHER SUCH THAT THEY TOUCH.

PROJECT REFERENCE NO.	SHEET NO.
Buffalo Mtn. Surface Mine	2-B

PRELIMINARY PLANS
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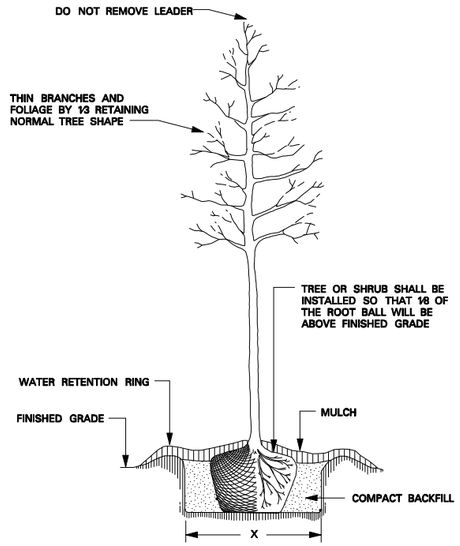
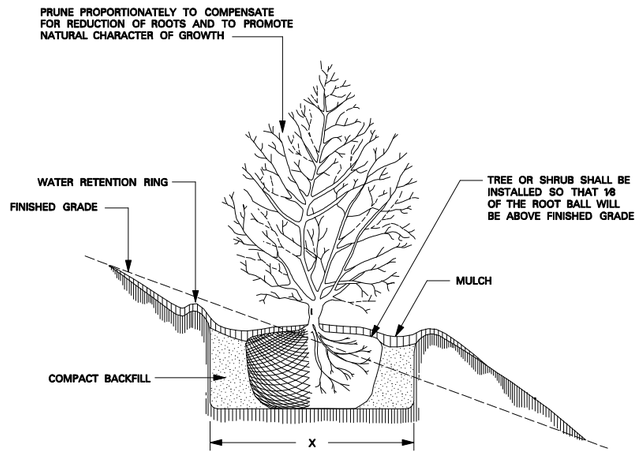
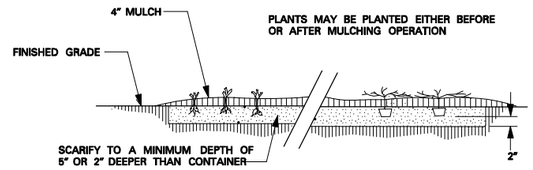
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822



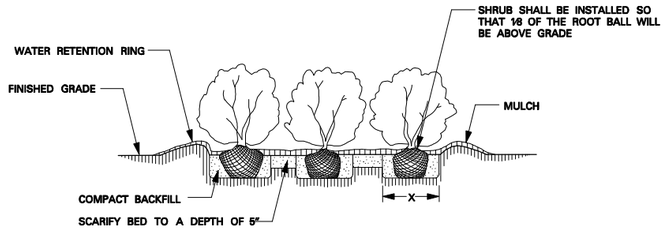
TREE OR SHRUB PLANTING DETAIL
GROUND LEVEL



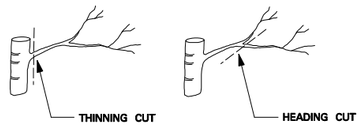
TREE OR SHRUB PLANTING DETAIL
SLOPING GROUND



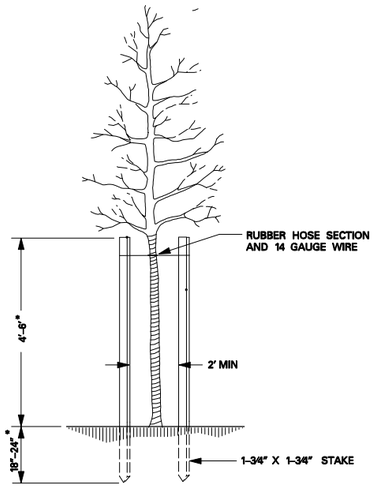
GROUNDCOVER PLANTING DETAIL



SHRUB BED PLANTING DETAIL



PRUNING CUTS

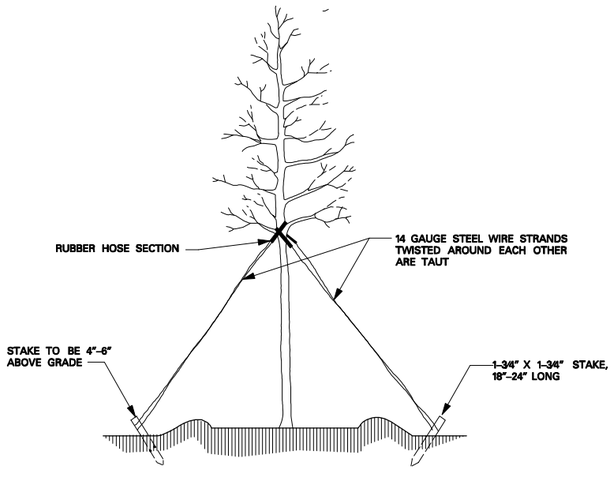


STAKING DETAIL FOR TREES 6' TO 10' TALL

NOTE:
UTILIZE STAKING DETAIL ONLY IF REQUESTED BY THE ENGINEER.

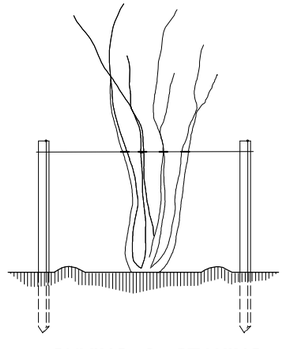
PLAN VIEW

* EXACT LENGTH WITHIN INDICATED RANGE TO BE DETERMINED BY ENGINEER IN THE FIELD.



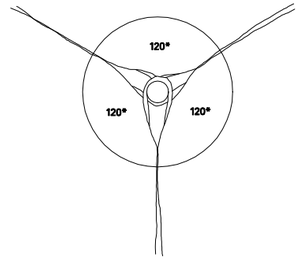
TREE GUYING DETAIL FOR TREES 10' OR TALLER

NOTE:
UTILIZE GUYING DETAIL ONLY IF REQUESTED BY THE ENGINEER.

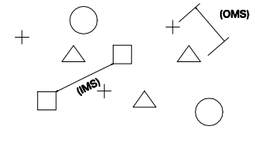


GUYING & STAKING

NOTES:
1. SCHEDULE FOR PLANT HOLE SIZE: CONTAINER OR ROOT BALL SIZE X = 2 TIMES THE DIAMETER OF THE CONTAINER OR THE ROOT BALL DIAMETER
2. FERTILIZER SHALL BE APPLIED AT THE TIME OF PLANTING. FERTILIZER SHALL BE A SLOW RELEASE PELLET OR TABLET.FORMULATION SHALL BE APPROVED BY ENGINEER.
3. RATES SHALL BE PER MANUFACTURERS RECOMMENDATIONS AND APPROVED BY THE ENGINEER.THOROUGHLY MIX WITH TOPSOIL, BACKFILL OR SCARIFIED SOIL.
4. REMOVE BURLAP FROM TOP OF BALL BEFORE BACKFILLING AROUND BALL IS COMPLETE.



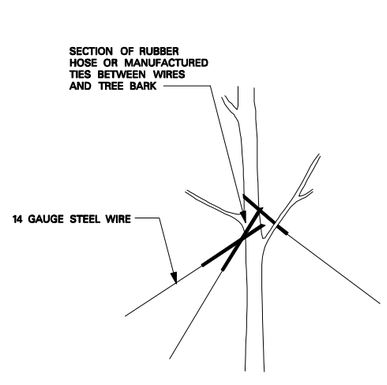
GUY SPACING DETAIL



RANDOM PLANT SPACING DETAIL–PLAN VIEW

1. AN OVERALL MINIMUM SPACING DISTANCE (OMS) IS ASSIGNED TO THE PLANTING CONFIGURATION (SEE PLANT SCHEDULE).

2. AN INDIVIDUAL MINIMUM SPACING DISTANCE (IMS) IS ASSIGNED TO EACH INDIVIDUAL SPECIES (SEE PLANT SCHEDULE).



GUY TYING DETAIL

PROJECT REFERENCE NO.	SHEET NO.
Buffalo Mtn. Surface Mine	2-C

PRELIMINARY PLANS
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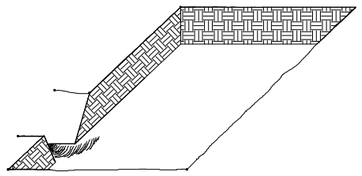
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

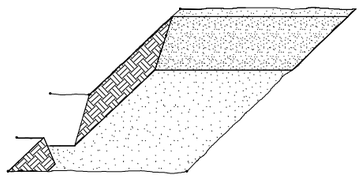
SEEDLING / LINER BAREROOT PLANTING DETAIL

HEALING IN

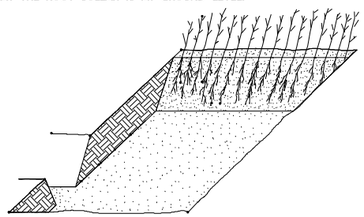
1. LOCATE A HEALING-IN SITE IN A SHADY, WELL PROTECTED AREA.
2. EXCAVATED A FLAT BOTTOM TRENCH 12 INCHES DEEP AND PROVIDE DRAINAGE.



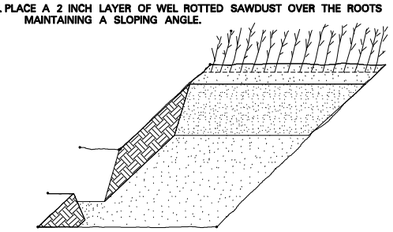
3. BACKFILL THE TRENCH WITH 2 INCHES OF WELL ROTTED SAWDUST. PLACE A 2 INCH LAYER OF WELL ROTTED SAWDUST AT A SLOPING ANGLE AT ONE END OF THE TRENCH.



4. PLACE A SINGLE LAYER OF PLANTS AGAINST THE SLOPING END SO THAT THE ROOT COLLAR IS AT GROUND LEVEL.

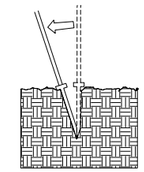


5. PLACE A 2 INCH LAYER OF WEL ROTTED SAWDUST OVER THE ROOTS MAINTAINING A SLOPING ANGLE.

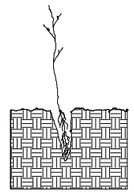


6. REPEAT LAYERS OF PLANTS AND SAWDUST AS NECESSARY AND WATER THOROUGHLY.

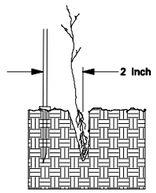
DIBBLE PLANTING METHOD USING THE KBC PLANTING BAR



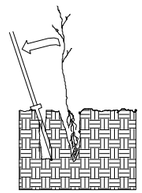
1. INSERT PLANTING BAR AS SHOWN AND PULL HANDLE TOWARD PLANTER.



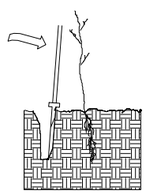
2. REMOVE PLANTING BAR AND PLACESEEDING AT CORRECT DEPTH.



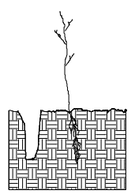
3. INSERT PLANTING BAR 2 INCHES TOWARD PLANTER FROM SEEDING.



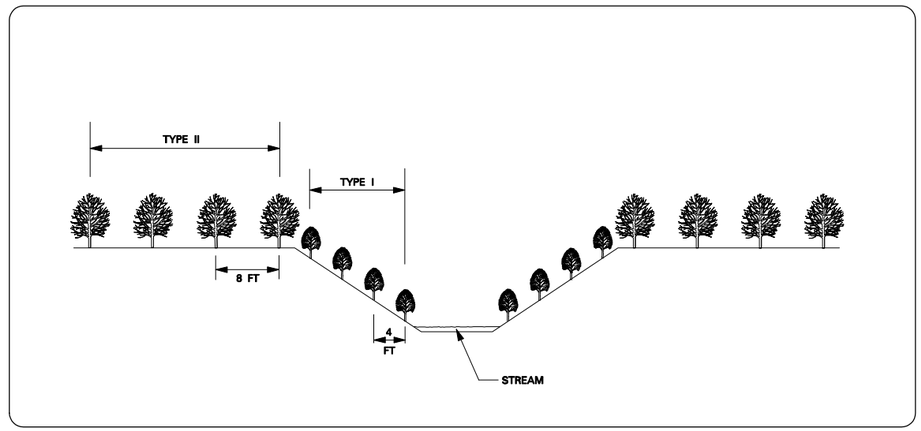
4. PULL HANDLE OF BAR TOWARD PLANTER, FIRMING SOIL AT BOTTOM.



5. PUSH HANDLE FORWARD FIRMING SOIL AT TOP.



6. LEAVE COMPATION HOLE OPEN. WATER THOROUGHLY.



PLANTING NOTES:

PLANTING BAG

DURING PLANTING, SEEDLINGS SHALL BE KEPT IN A MOIST CANVAS BAG OR SIMILAR CONTAINER TO PREVENT THE ROOT SYSTEMS FROM DRYING.

KBC PLANTING BAR

PLANTING BAR SHALL HAVE A BLADE WITH A TRIANGULAR CROSS SECTION, AND SHALL BE 12 INCHES LONG, 4 INCHES WIDE AND 1 INCH THICK AT CENTER.

ROOT PRUNING

ALL SEEDLINGS SHALL BE ROOT PRUNED, IF NECESSARY, SO THAT NO ROOTS EXTEND MORE THAN 10 INCHES BELOW THE ROOT COLLAR.

SEE PLAN SHEETS FOR AREAS TO BE PLANTED

12/8/2009

\\Charfs1\Vol5\Projects\Mining\Mine Projects\Consol\Buffalo Mountain\DWG\On-Site Creation\Plan Views\Const\0802F_BM_dtl.dgn

Dimension Design Criteria

PROJECT REFERENCE NO.	SHEET NO.
Buffalo Mtn. Surface Mine	2-D

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

On-Site Establishment

SD #	Length (ft)	$Q_{1.5}$ (cfs)	DA (mi^2)	D84 (mm, Colorado)	Wbkf (ft)	Bot Width	Abkf (ft^2)	Dbkf (ft)	Wfp (min)	Wfp (max)	MWR	Wpool (min)	Wpool (max)	P-P (min)	P-P (max)
55	870	1.4	0.006	66.9	5.7	3.8	2.7	0.5	8.5	13.0	5.0	6.2	8.5	8.5	28.3
1a	1535	2.7	0.015	68.2	5.8	3.8	2.8	0.5	8.6	13.3	6.4	6.3	8.6	8.6	28.8
1	730	1.5	0.007	66.9	5.7	3.8	2.7	0.5	8.5	13.0	6.2	6.2	8.5	8.5	28.3
6b	895	1.7	0.008	67.2	5.7	3.8	2.7	0.5	8.5	13.1	6.2	6.2	8.5	8.5	28.4
6	552	4.2	0.026	69.8	5.9	3.9	2.9	0.5	8.9	13.6	9.3	6.5	8.9	8.9	29.6
5a	879	1.9	0.009	67.3	5.7	3.8	2.7	0.5	8.5	13.1	7.2	6.3	8.5	8.5	28.5
5	562	3.2	0.018	68.7	5.8	3.9	2.8	0.5	8.7	13.4	7.1	6.4	8.7	8.7	29.0
20	971	2.0	0.010	67.5	5.7	3.8	2.7	0.5	8.6	13.1	6.7	6.3	8.6	8.6	28.5
20a	904	2.0	0.010	67.4	5.7	3.8	2.7	0.5	8.6	13.1	6.8	6.3	8.6	8.6	28.5
21	892	1.9	0.010	67.4	5.7	3.8	2.7	0.5	8.5	13.1	6.8	6.3	8.5	8.5	28.5
23	1002	1.8	0.009	67.3	5.7	3.8	2.7	0.5	8.5	13.1	6.7	6.3	8.5	8.5	28.4
28	1301	2.2	0.011	67.6	5.7	3.8	2.7	0.5	8.6	13.1	6.0	6.3	8.6	8.6	28.6
34	857	1.5	0.007	67.0	5.7	3.8	2.7	0.5	8.5	13.0	5.9	6.2	8.5	8.5	28.3
34a	1447	3.6	0.021	69.1	5.8	3.9	2.9	0.5	8.8	13.5	8.0	6.4	8.8	8.8	29.2
70	752	1.6	0.008	67.0	5.7	3.8	2.7	0.5	8.5	13.0	6.5	6.2	8.5	8.5	28.3
67	1223	4.5	0.028	70.2	5.9	4.0	2.9	0.5	8.9	13.7	10.5	6.5	8.9	8.9	29.7
67a	1235	1.7	0.008	67.2	5.7	3.8	2.7	0.5	8.5	13.1	5.5	6.2	8.5	8.5	28.4
66	787	1.1	0.005	66.6	5.6	3.8	2.6	0.5	8.4	13.0	5.3	6.2	8.4	8.4	28.2
66a	883	2.4	0.013	67.9	5.7	3.8	2.7	0.5	8.6	13.2	8.0	6.3	8.6	8.6	28.7
63a	905	1.1	0.005	66.6	5.6	3.8	2.6	0.5	8.4	12.9	4.9	6.2	8.4	8.4	28.2
90	1015	1.4	0.006	66.9	5.7	3.8	2.7	0.5	8.5	13.0	5.3	6.2	8.5	8.5	28.3
90a	884	2.1	0.011	67.6	5.7	3.8	2.7	0.5	8.6	13.1	7.3	6.3	8.6	8.6	28.6
80	1342	2.9	0.016	68.4	5.8	3.9	2.8	0.5	8.7	13.3	7.3	6.4	8.7	8.7	28.9
80a	532	1.2	0.005	66.6	5.6	3.8	2.6	0.5	8.4	13.0	6.3	6.2	8.4	8.4	28.2
85	1334	2.2	0.011	67.6	5.7	3.8	2.7	0.5	8.6	13.1	6.0	6.3	8.6	8.6	28.6
110a	1042	2.4	0.013	67.8	5.7	3.8	2.7	0.5	8.6	13.2	7.3	6.3	8.6	8.6	28.7
110	1172	2.8	0.015	68.2	5.8	3.8	2.8	0.5	8.7	13.3	7.4	6.3	8.7	8.7	28.9
108a	758	2.2	0.011	67.6	5.7	3.8	2.7	0.5	8.6	13.2	8.1	6.3	8.6	8.6	28.6
108	1043	2.6	0.014	68.1	5.8	3.8	2.8	0.5	8.6	13.2	7.7	6.3	8.6	8.6	28.8
100	774	3.8	0.023	69.4	5.9	3.9	2.9	0.5	8.8	13.5	7.4	6.5	8.8	8.8	29.4

29,079

Off-Site Establishment

EC#	Length (ft)	DA_{21} (mi^2)	Wbkf (ft)	Abkf (ft^2)	Dbkf (ft)	Wpool (min)	Wpool (max)	P-P (min)	P-P (max)
55	883	0.010	5.2	2.7	0.5	5.7	7.8	7.8	15.6
1a	517	0.015	5.3	2.8	0.5	5.8	7.9	7.9	15.8
1	362	0.008	5.2	2.7	0.5	5.7	7.8	7.8	15.5
6b	588	0.008	5.2	2.7	0.5	5.7	7.8	7.8	15.6
5a	542	0.010	5.2	2.7	0.5	5.7	7.8	7.8	15.6
5	735	0.019	5.3	2.8	0.5	5.8	8.0	8.0	15.9
20	387	0.015	5.3	2.8	0.5	5.8	7.9	7.9	15.8
20a	502	0.013	5.2	2.7	0.5	5.8	7.9	7.9	15.7
21	480	0.014	5.2	2.8	0.5	5.8	7.9	7.9	15.7
23	866	0.015	5.3	2.8	0.5	5.8	7.9	7.9	15.8
28	474	0.014	5.3	2.8	0.5	5.8	7.9	7.9	15.8
34	557	0.013	5.2	2.7	0.5	5.8	7.9	7.9	15.7
70	667	0.012	5.2	2.7	0.5	5.7	7.8	7.8	15.7
67	728	0.035	5.5	3.0	0.6	6.1	8.3	8.3	16.5
67a	563	0.011	5.2	2.7	0.5	5.7	7.8	7.8	15.7
66	582	0.006	5.2	2.7	0.5	5.7	7.7	7.7	15.5
66a	817	0.014	5.3	2.8	0.5	5.8	7.9	7.9	15.8
63a	846	0.005	5.1	2.6	0.5	5.7	7.7	7.7	15.4
90	1006	0.017	5.3	2.8	0.5	5.8	7.9	7.9	15.9
90a	797	0.018	5.3	2.8	0.5	5.8	8.0	8.0	15.9
80	631	0.018	5.3	2.8	0.5	5.8	8.0	8.0	15.9
85	183	0.011	5.2	2.7	0.5	5.7	7.8	7.8	15.7
110a	600	0.014	5.2	2.8	0.5	5.8	7.9	7.9	15.7
110	930	0.019	5.3	2.8	0.5	5.8	8.0	8.0	15.9
108a	776	0.012	5.2	2.7	0.5	5.8	7.8	7.8	15.7
100	325	0.023	5.4	2.9	0.5	5.9	8.0	8.0	16.1

16,345

GENERAL NOTES

Grading activities will be performed in the dry as much as possible. For instances in which the Contractor must work within the stream, all equipment shall be removed from the channel at the end of each working day. The Contractor shall enter and exit the stream channel at locations where disturbance will be minimized. Silt checks shall be used in appropriated locations. The Contractor shall not disturb more stream bank area than can be stabilized in one working day. Erosion control matting and temporary seeding shall be placed on all disturbed banks.

Excavated material will be temporarily stockpiled in designated areas. Silt fence shall be used to prevent sediment migration from the stockpiles toward the open channels on site. Any stockpiled soil which is not used within 15 working days or 30 calendar days, whichever is sooner, shall be covered with mulch and temporary seeding.

The following construction sequence shall be used during construction

1. Mobilize equipment and materials to the site and set up staging areas and erosion control measures
2. Restrict construction traffic to the areas denoted as haul roads and staging areas.
3. Silt fencing shall be placed around staging and temporary stockpile areas.
   Once construction is completed at a particular working area, temporary seeding and mulching shall be applied before progressing to a new area.
   Any disturbed areas shall have temporary or permanent ground cover applied within 15 working days or 30 calendar days, whichever is sooner, following the completion of grading activities in that area.
4. The sequence in which the mitigation area is constructed is to be decided by the Contractor. Contractor should finish one reach before moving on to the next. However, all newly constructed, relocated channel sections shall be stabilized and covered with erosion control matting by the end of the working day.
5. In–stream structures shall be constructed in the wet. Activity within the stream shall be kept to a minimum. Equipment will only enter the stream as necessary.
6. All disturbed areas shall be seeded and mulched before leaving the project site.
7. Prior to demobilization of equipment from site, ensure that the site is free from trash and leftover materials.
8. Demobilize equipment from site.
9. Plant riparian vegetation and permanent (pasture and riparian) seeding at the appropriate time of year.

PROJECT REFERENCE NO.	SHEET NO.
BUFFALO MTN. SURFACE MINE	3

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

APPROVED BY:

DATE:

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

Begin SD-34a

Create Floodplain At Toe of Existing Sediment Ditch

Top of Existing Sediment Ditch

Bankfull Channel To Be Excavated From Existing Sediment Ditch Bottom Width

MATCHLINE SEE SHEET 4

Groin Ditch

Preservation Area

Preservation Area

Permit Boundry

N

SD-34a
Sta. 0+00 to 6+00

PLAN AND PROFILE

10 10 0 20 40
SCALE (FT)

1460
1456
1452
1448
1444
1440
1436
1432
1428

PROPOSED ELEVATIONS

EXISTING ELEVATIONS

CONCEPTUAL PROFILE

0+00 1+00 2+00 3+00 4+00 5+00 6+00

12/4/2009

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PROJECT REFERENCE NO.	SHEET NO.
BUFFALO MTN. SURFACE MINE	4

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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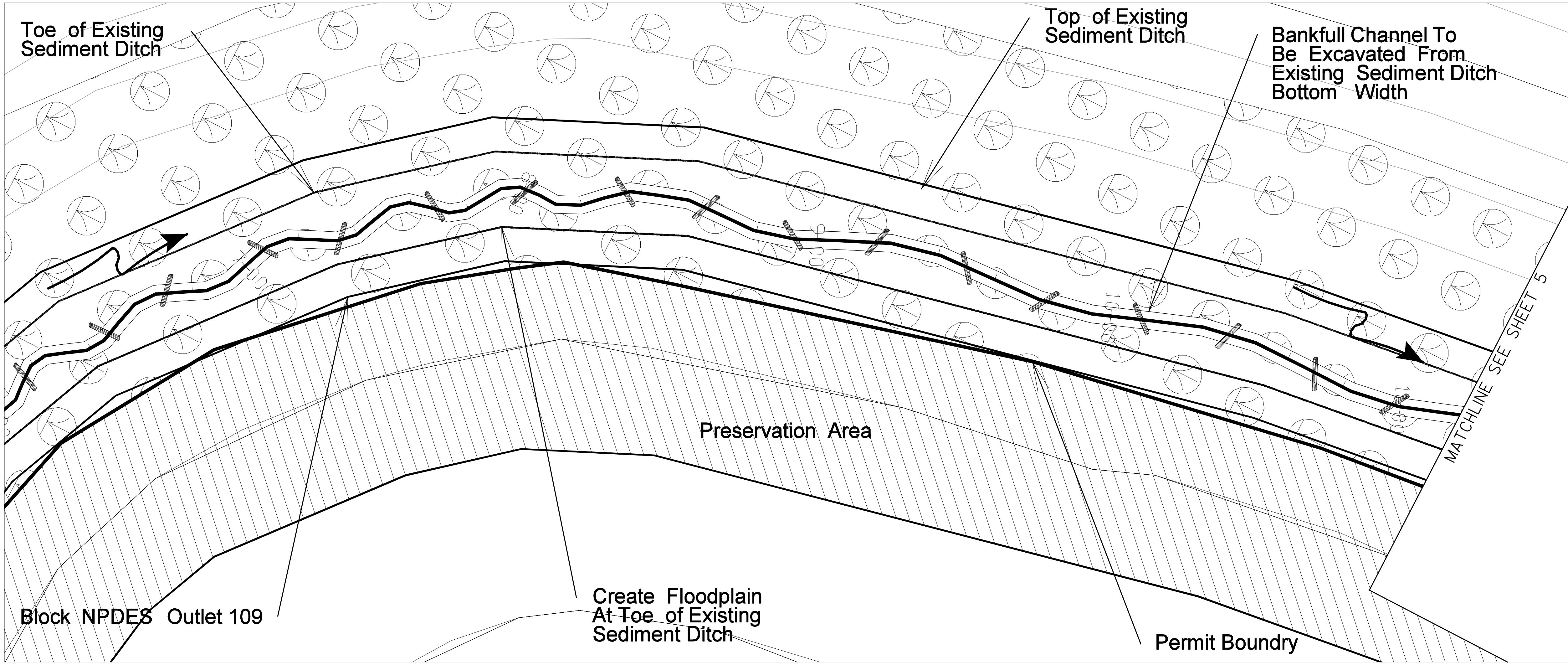
DATE:

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822



SD-34a
Sta. 6+00 to 11+20

PLAN AND PROFILE

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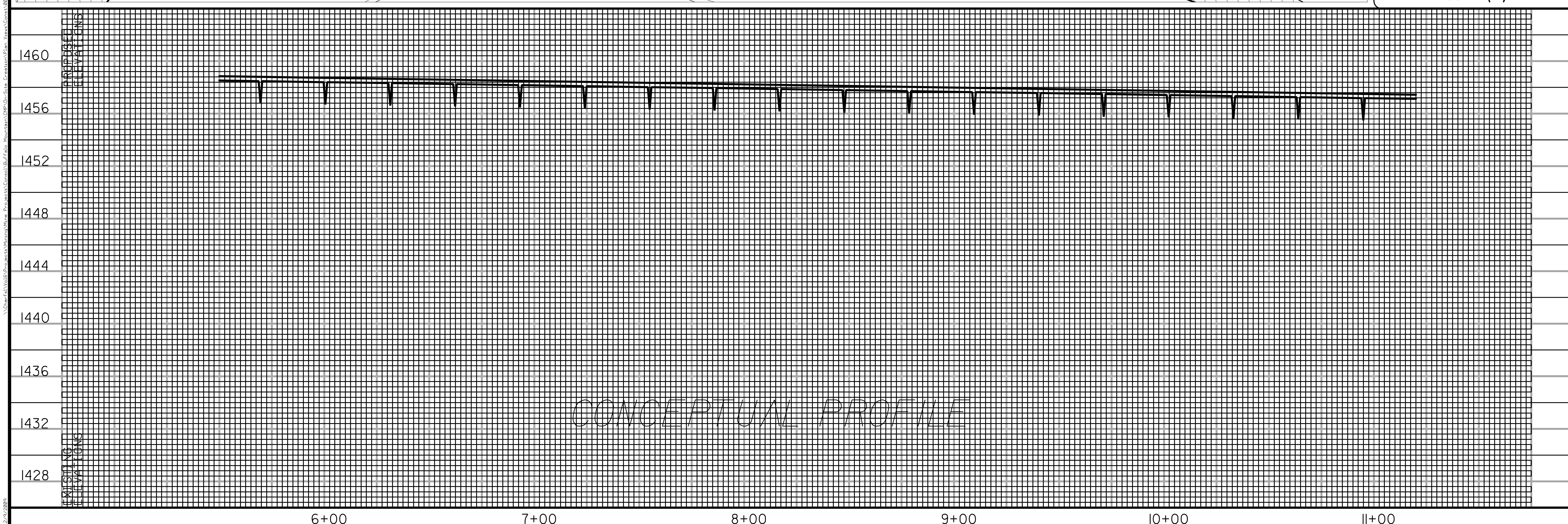
SCALE (FT)



PROJECT REFERENCE NO.	SHEET NO.
BUFFALO MTN. SURFACE MINE	5

PRELIMINARY PLANS
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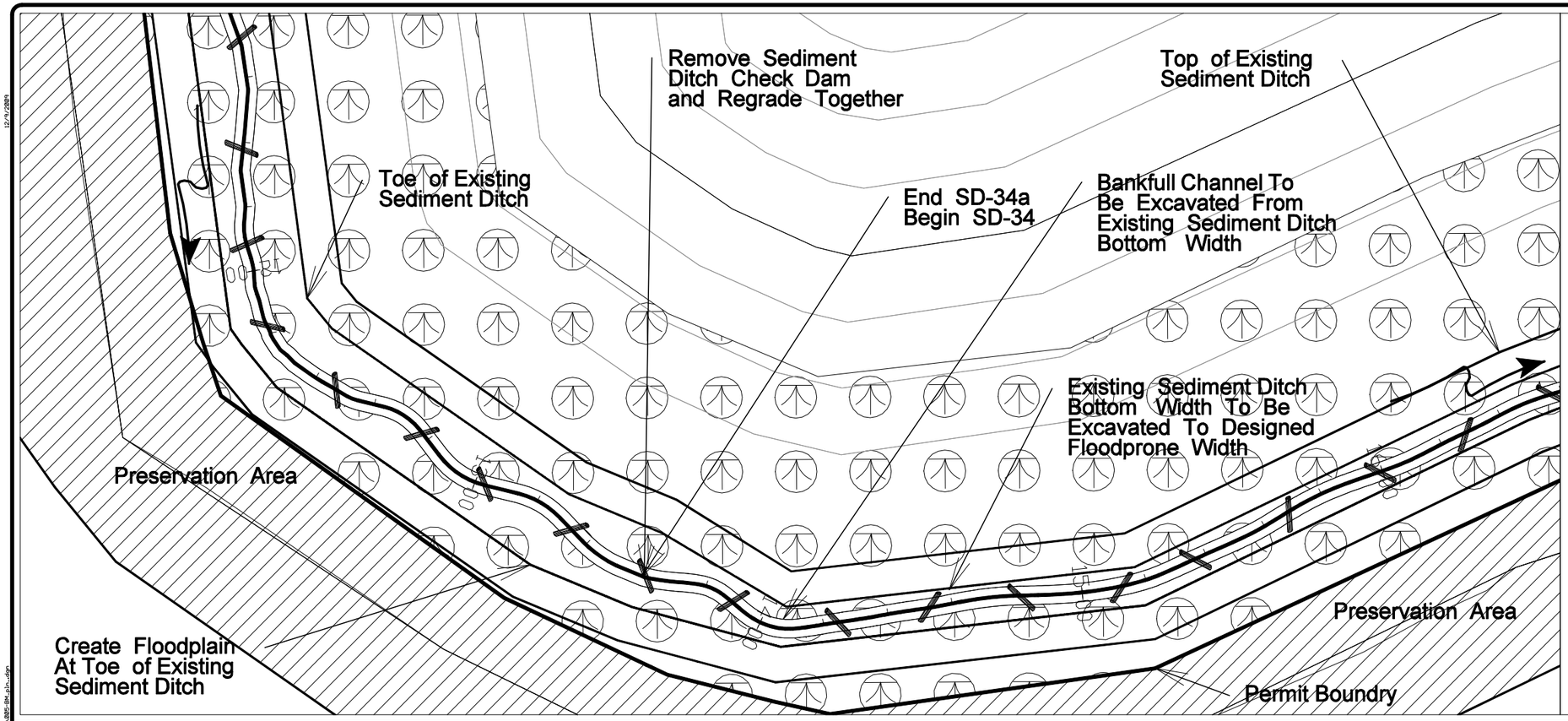
Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822



SD-34a & SD-34
Sta. 11+20 to 16+60

PLAN AND PROFILE

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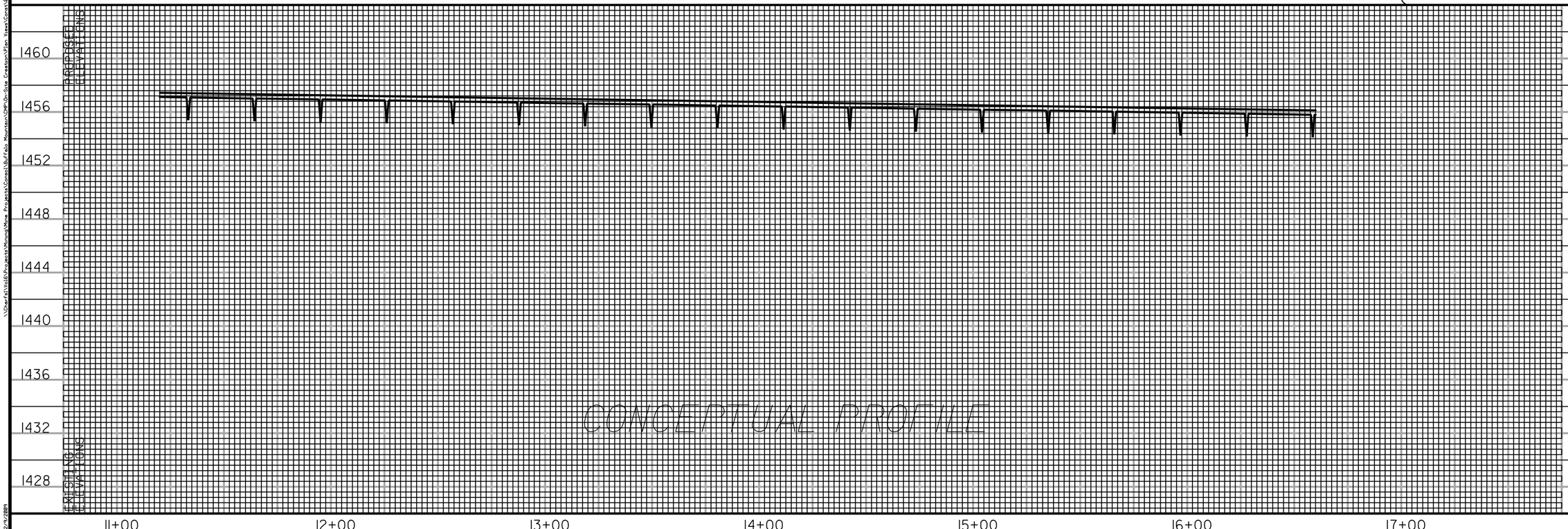
SCALE (FT)



12/4/2009
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PROJECT REFERENCE NO.	SHEET NO.
BUFFALO MTN. SURFACE MINE	6

PRELIMINARY PLANS
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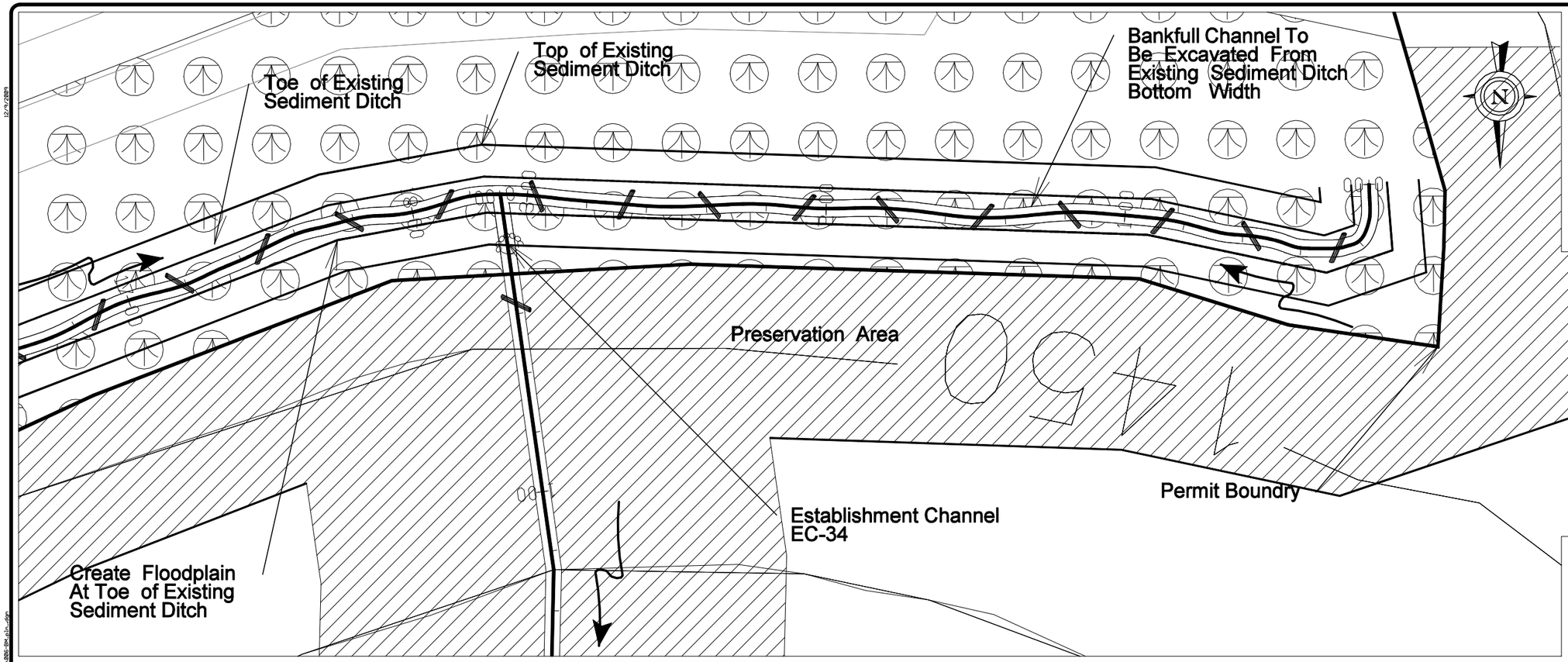
DATE:

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822



SD-34
Sta. 16+60 to 18+30 &
Sta. 0+00 to 3+10

PLAN AND PROFILE

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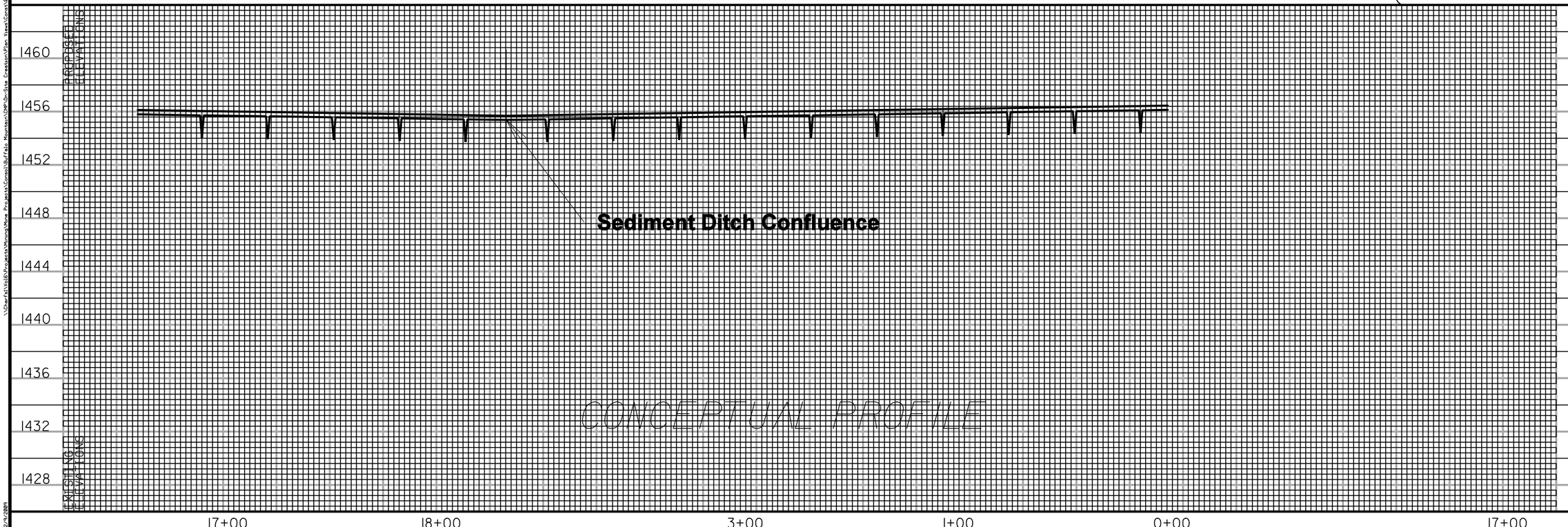
SCALE (FT)



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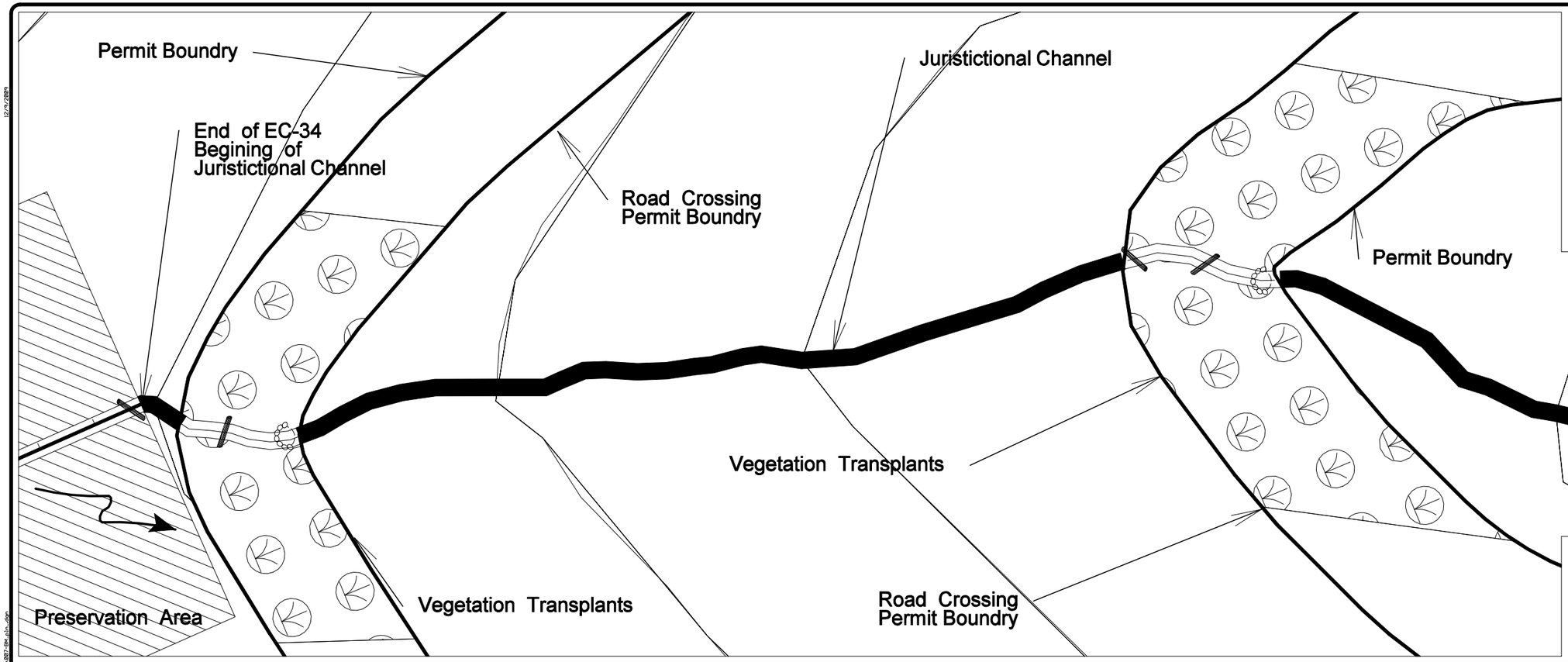

PROJECT REFERENCE NO.	SHEET NO.
BUFFALO MTN. SURFACE MINE	7

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

APPROVED BY:

DATE:

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

PLAN AND PROFILE

10 10 0 20 40
SCALE (FT)

PROFILE TO BE DESIGNED
UPON FINAL CONSTRUCTION

PROPOSED ELEVATIONS
EXISTING ELEVATIONS

1460
1410
1360
1310
1260
1210
1160
1110
1060

0+00 1+00 2+00 3+00 4+00 5+00 6+00

12/4/2009
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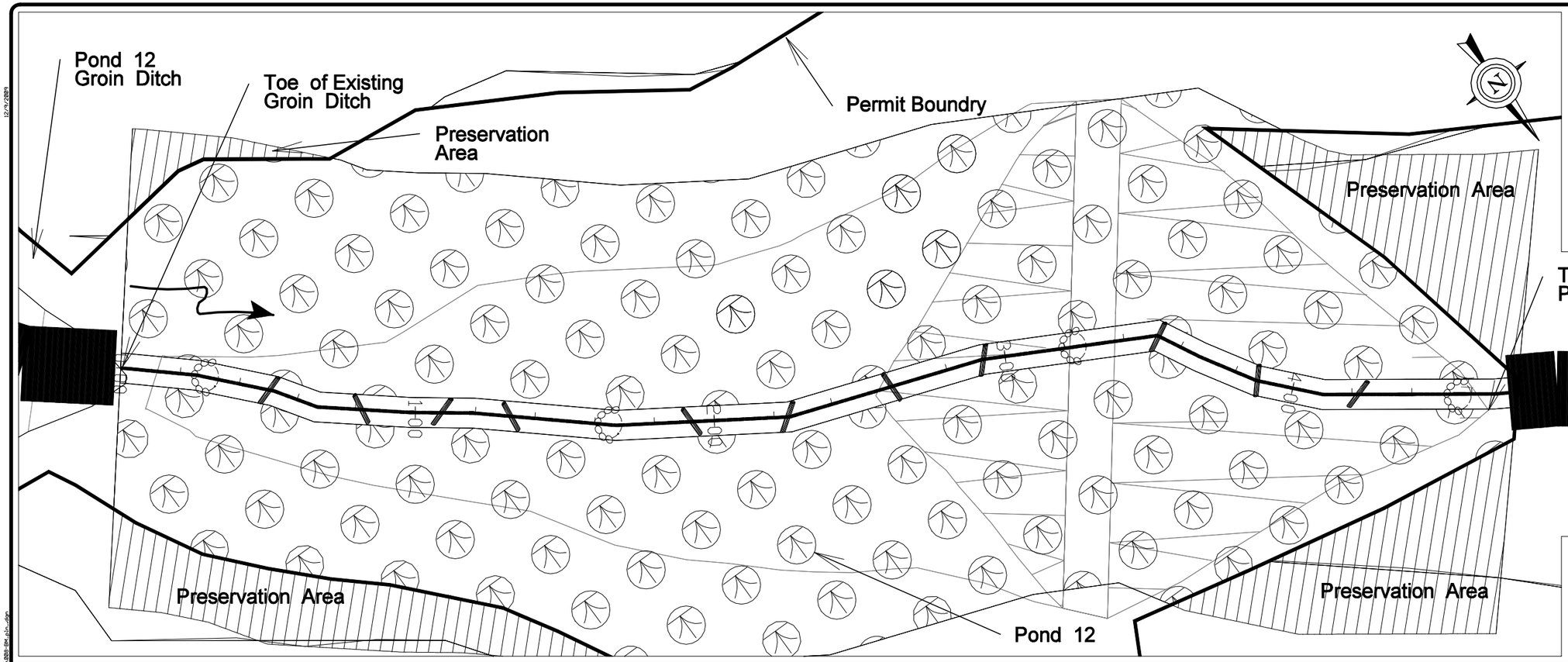

PROJECT REFERENCE NO.	SHEET NO.
BUFFALO MTN. SURFACE MINE	8

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

APPROVED BY:

DATE:

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

PLAN AND PROFILE

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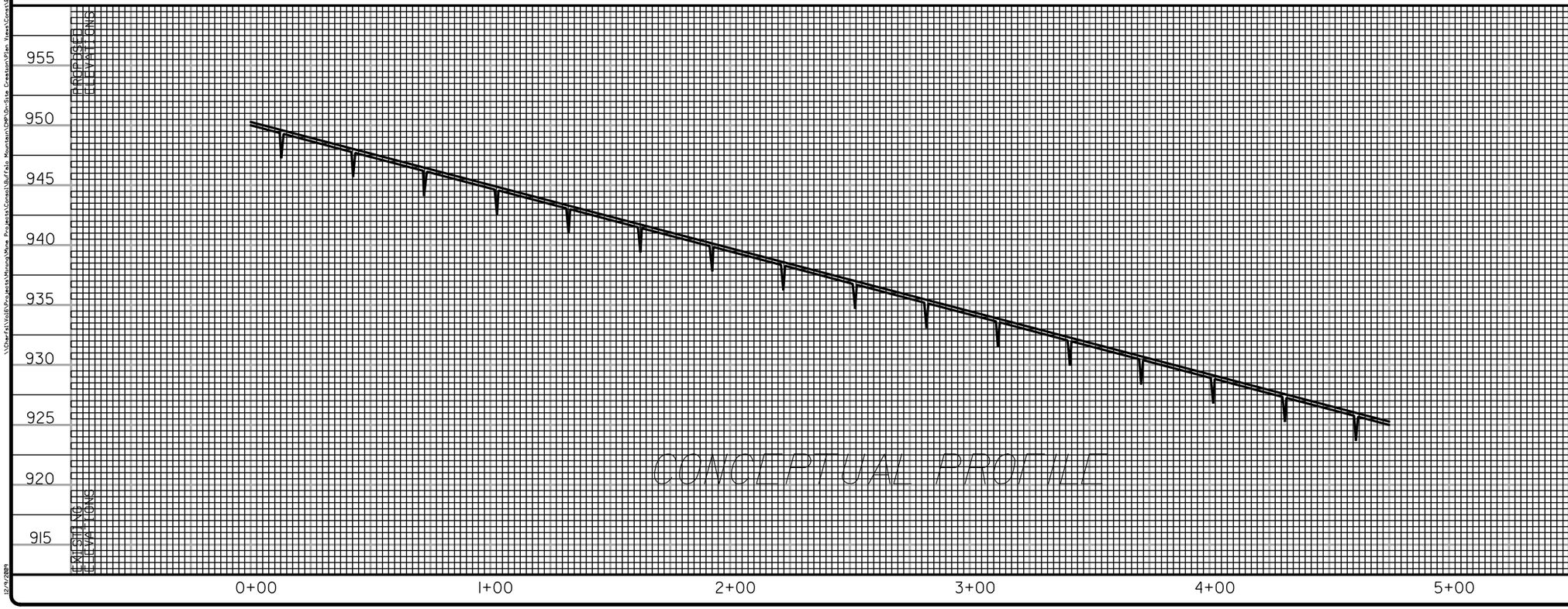
SCALE (FT)



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5088 West Washington Street
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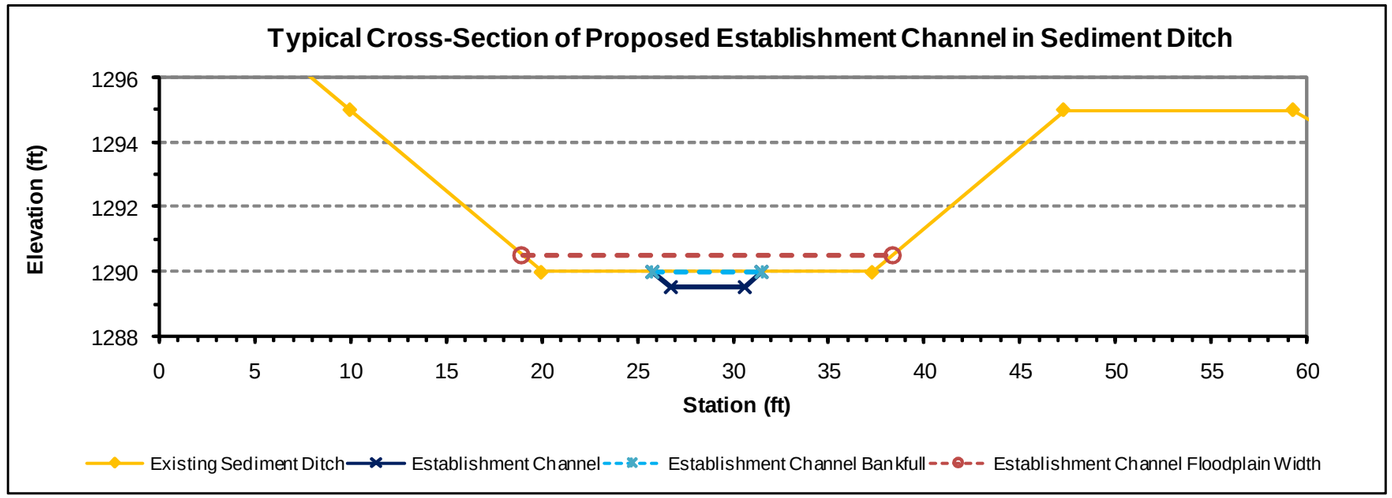
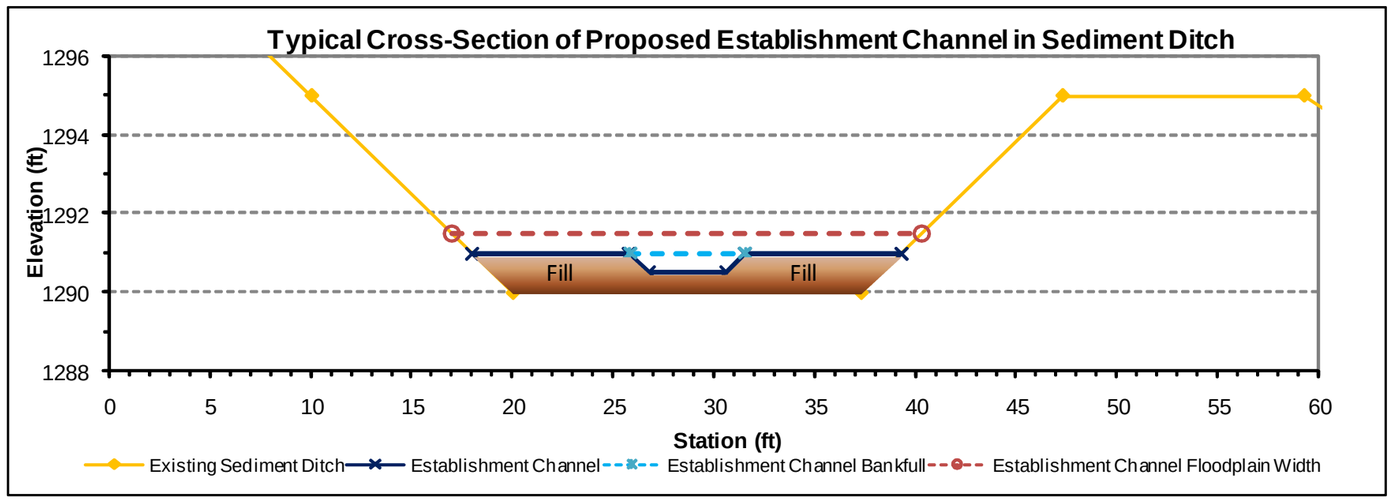


Note: All on–site establishment channels will involve digging a bankfull channel into the sediment channel bottom. Sediment Ditches 55, 63a, 66, 67a, and 90 will involve also excavating some of the side slopes for sufficient floodplain areas (see Sheets 10–11).



Note: If bedrock is encountered when digging into channel bottom and maximum depth can not be reached, the channel will have to be filled to construct proper channel dimensions.

PROJECT REFERENCE NO.	SHEET NO.
Buffalo Mtn. Surface Mine	10

PRELIMINARY PLANS
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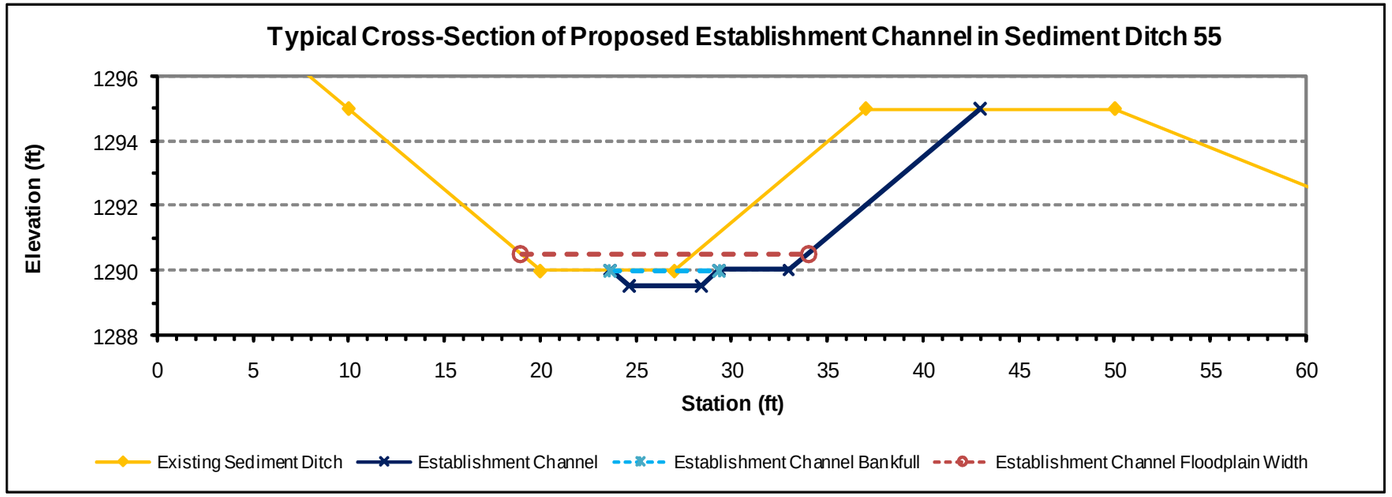
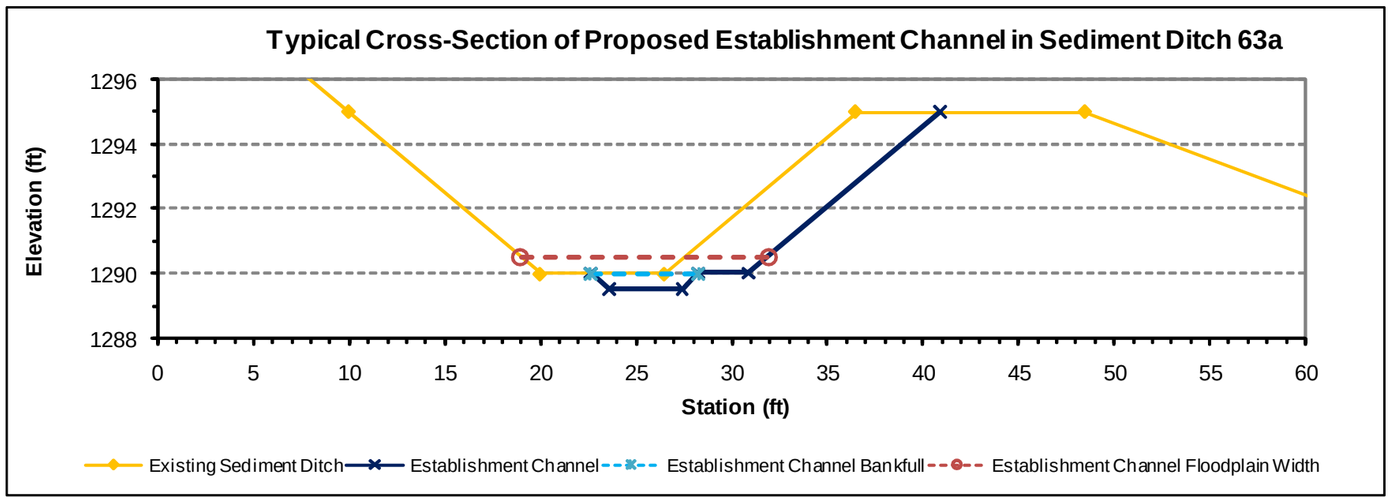
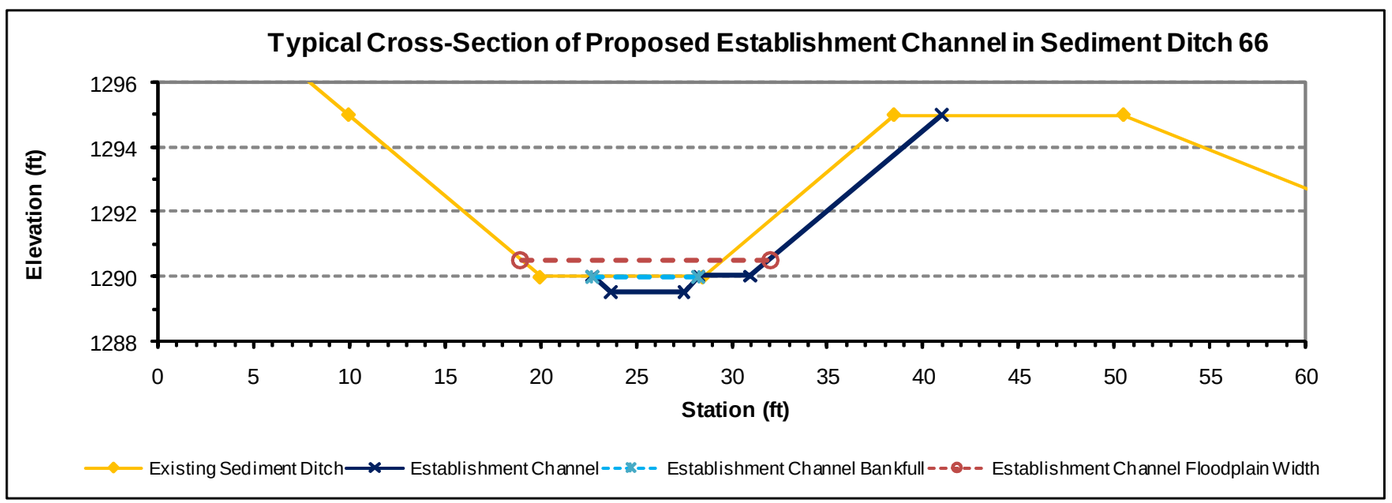
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822







PROJECT REFERENCE NO.	SHEET NO.
Buffalo Mtn. Surface Mine	11

PRELIMINARY PLANS
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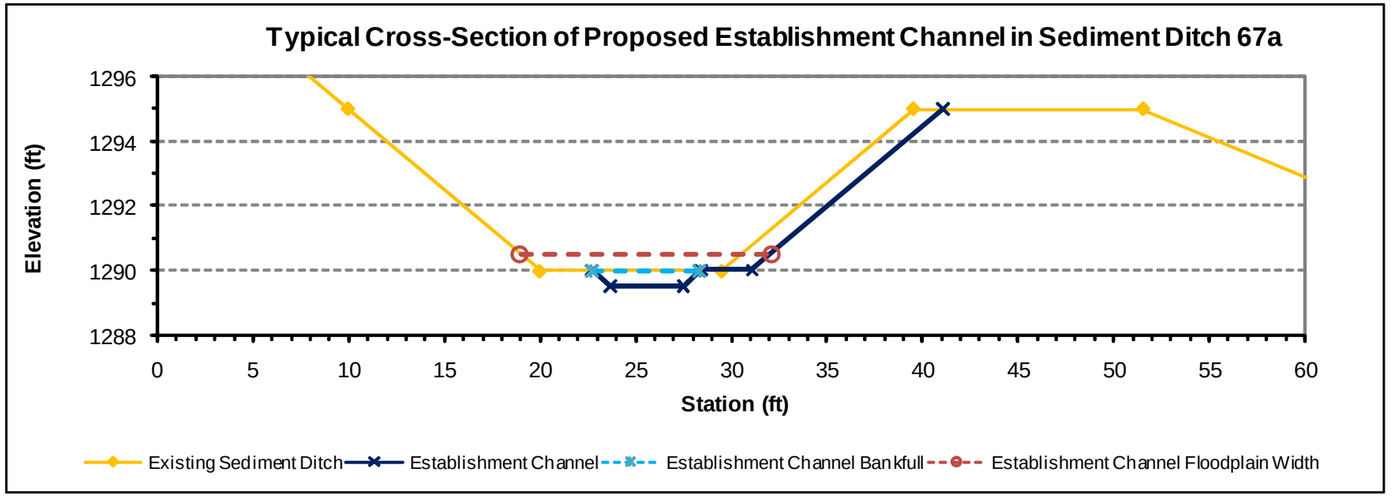
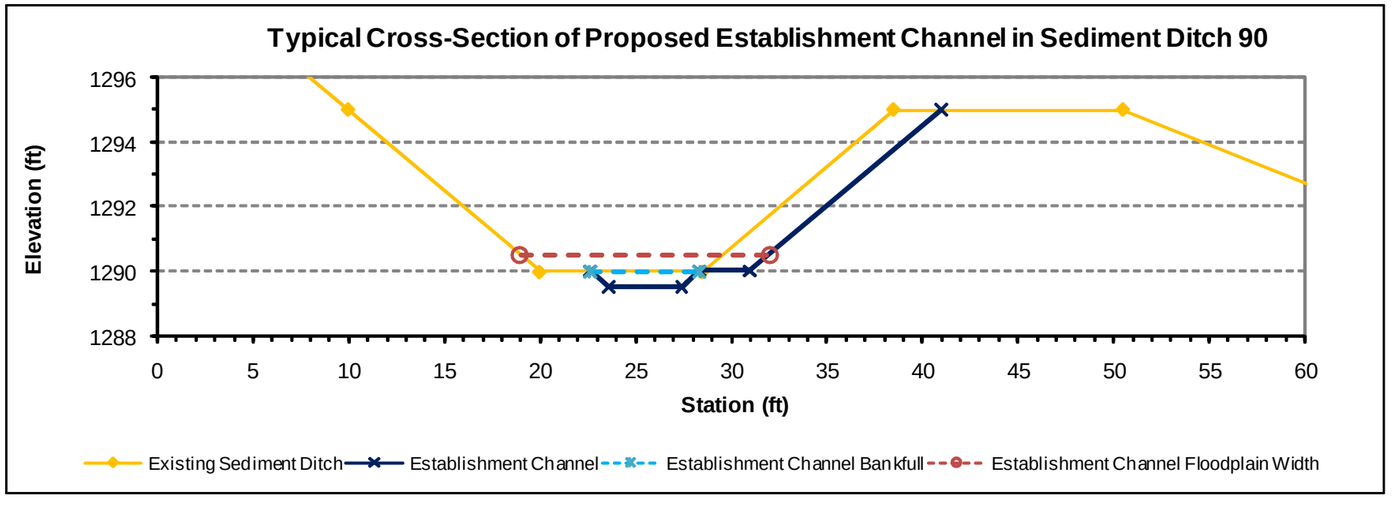
Fax: 304.769.0822





PROJECT REFERENCE NO.	SHEET NO.
Buffalo Mtn. Surface Mine	0

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

7/13/2009

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Appendix J:

Off-Site Enhancement/Restoration in Hell Creek,

Conceptual Design Plan Sheets

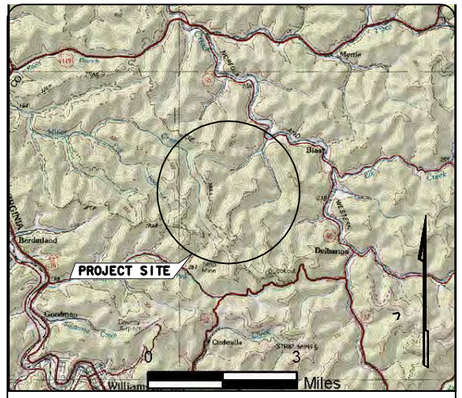
PROJECT: Buffalo Mountain Surface Mine

STATE	BAKER PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
WV	Buffalo Mtn. Surface Mine	1	18

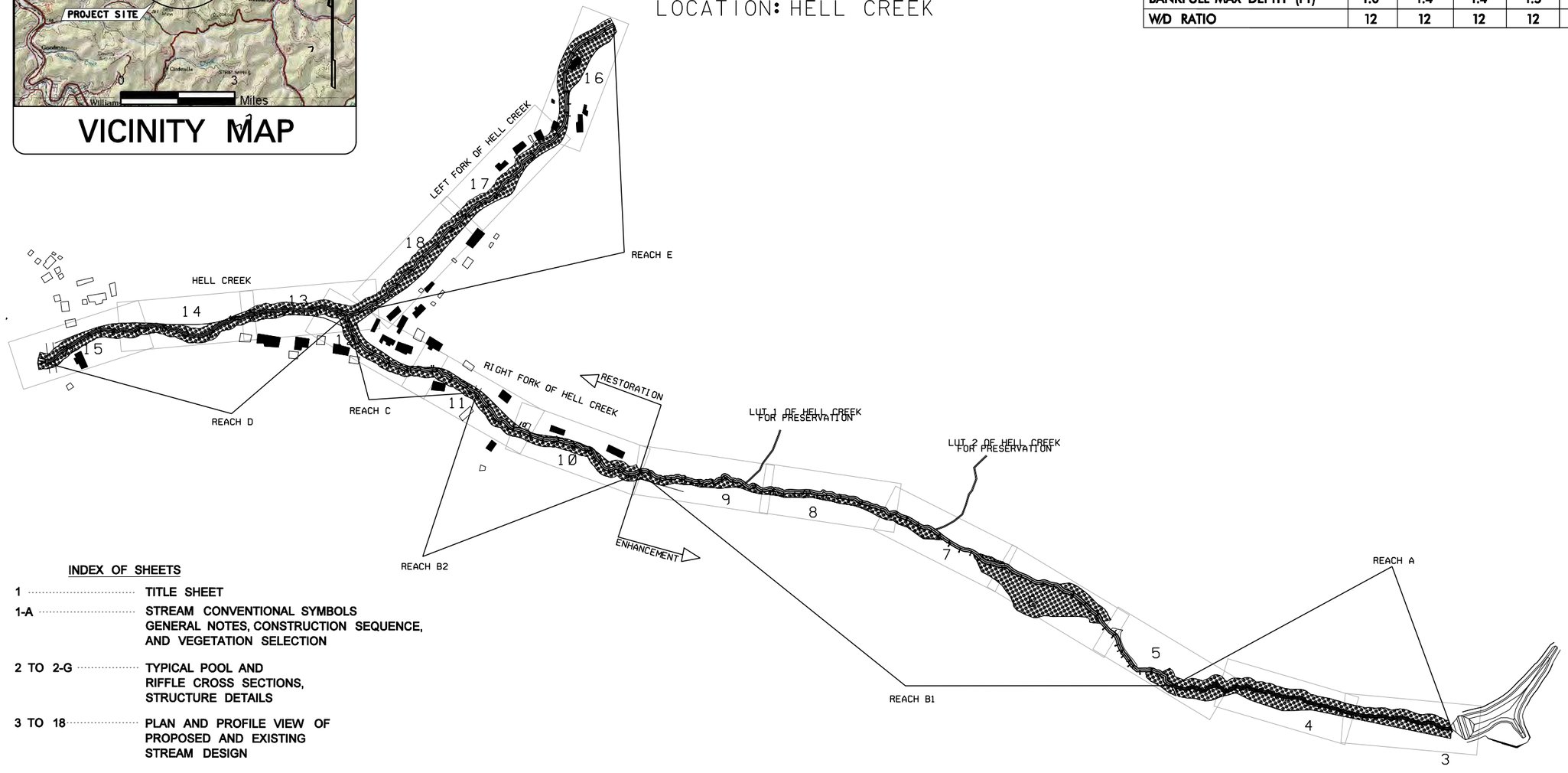
BUFFALO MTN. SURFACE MINE
CONSOL OF KENTUCKY, INC
MINGO COUNTY

TYPE OF WORK: STREAM RESTORATION
LOCATION: HELL CREEK

	HELL CREEK					
	REACH A	REACH B1	REACH B2	REACH C	REACH D	REACH E
DESIGN STREAM TYPE	B4	B4	B4	B4	B4	B4
DESIGN REACH LENGTH (LF)	1318	2733	867	737	1462	1878
BANKFULL XSEC AREA (SF)	10.7	19.3	19.3	22.6	43.6	26.7
BANKFULL WIDTH (FT)	11.3	15.2	15.2	16.5	22.9	17.9
BANKFULL MEAN DEPTH (FT)	0.9	1.3	1.3	1.4	1.9	1.5
BANKFULL MAX DEPTH (FT)	1.0	1.4	1.4	1.5	2.1	1.6
W/D RATIO	12	12	12	12	12	12



VICINITY MAP



INDEX OF SHEETS

1	TITLE SHEET
1-A	STREAM CONVENTIONAL SYMBOLS GENERAL NOTES, CONSTRUCTION SEQUENCE, AND VEGETATION SELECTION
2 TO 2-G	TYPICAL POOL AND RIFFLE CROSS SECTIONS, STRUCTURE DETAILS
3 TO 18	PLAN AND PROFILE VIEW OF PROPOSED AND EXISTING STREAM DESIGN

GRAPHIC SCALES

20 10 0 20 40
PLANS

20 10 0 20 40
PROFILE (HORIZONTAL)

2 1 0 2 4
PROFILE (VERTICAL)

PREPARED IN THE OFFICE OF:

Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

PREPARED FOR THE OFFICE OF:
U.S. ARMY CORPS OF ENGINEERS
HUNTINGTON DISTRICT, REGULATORY BRANCH
502 EIGHTH STREET, HUNTINGTON, WV 25701

N/A
LETTING DATE:

PROJECT ENGINEER
C. MOWER / W. HARMAN
PROJECT DESIGNER

PROJECT ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

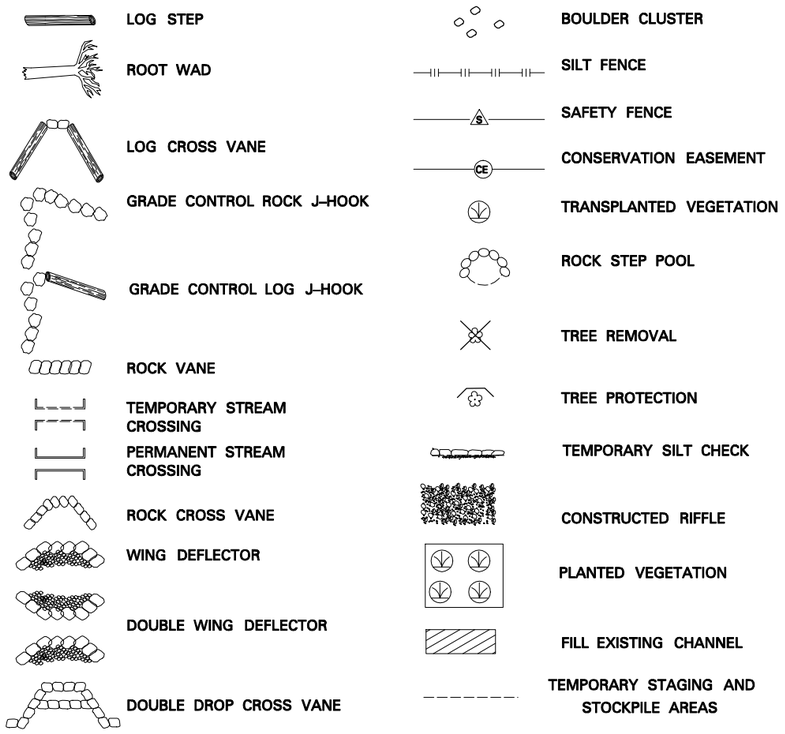
P.E.
SIGNATURE:

PROJECT REFERENCE NO.	SHEET NO.
Buffalo Mtn. Surface Mine	I-A

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Baker
Michael Baker Jr., Inc.
5058 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

STREAM CONVENTIONAL SYMBOLS



GENERAL NOTES

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5. In-stream structures shall be constructed in the wet. Activity within the stream shall be kept to a minimum. Equipment will only enter the stream as necessary.
6. All disturbed areas shall be seeded and mulched before leaving the project site.
7. Prior to demobilization of equipment from the site, ensure that the site is free of trash and leftover materials.
8. Demobilize equipment from the site.
9. Plant riparian vegetation and permanent (pasture and riparian) seeding at the appropriate time of the year.

VEGETATION SELECTION

BARE-ROOT TREES SPECIES SELECTED FOR REVEGETATION OF THE OFF-SITE MITIGATION AREAS

Common Name	Species Name	Minimum Spacing1	Frequency (%)	Density	Indicator	Strata	Spacing Type	Size
Stream Banks (Live Stakes)								
Silky dogwood	*Cornus obliqua*	2-3 ft apart	40%	65 to 100 stems per 1,000 SF	FACW	Tree	Random Triangular	2-3 feet long
Silky willow	*Salix sericea*	2-3 ft apart	40%	65 to 100 stems per 1,000 SF	OBL	Tree	Random Triangular	2-3 feet long
Elderberry	*Sambucus canadensis*	2-3 ft apart	20%	33 to 50 stems per 1,000 SF	FACW-	Tree	Random Triangular	2-3 feet long
Stream Riparian Buffer (Bare Root Trees)								
River birch	*Betula nigra*	8-10 ft apart	30%	140 stems per acre	FACW	Tree	Random Triangular	Seedling
Tulip poplar	*Liriodendron tulipifera*	8-10 ft apart	30%	140 stems per acre	FACU	Tree	Random Triangular	Seedling
American Beech	*Fagus grandifolia*	8-10 ft apart	20%	85 stems per acre	FACW-	Tree	Random Triangular	Seedling
Southern red oak	*Quercus rubra*	8-10 ft apart	20%	85 stems per acre	FACU-	Tree	Random Triangular	Seedling
Alternate Species								
Silky Cornel	*Cornus amomum*				FACW	Tree		
Black Willow	*Salix nigra*				FACW+	Tree		
Ninebark	*Physocarpus opulifolius*				FACW-	Tree		

PERMANENT SEED MIXTURES FOR REVEGETATION

Common Name	Species Name	Frequency	Density (lbs/acre)	Indicator	Strata	Size
Floodplain and Buffer Areas						
Virginia wildrye	*Elymus virginicus*	25%	2	FAC	Grass	Seed
Switchgrass	*Panicum virgatum*	25%	3	FAC+	Grass	Seed
Fox sedge	*Carex vulpinoidea*	25%	3	OBL	Grass	Seed
Redtop	*Agrostis alba*	25%	2	FAC	Grass	Seed
Restored Streambanks						
Virginia wildrye	*Elymus virginicus*	30%	12	FAC	Grass	Seed
Switchgrass	*Panicum virgatum*	30%	3	FAC+	Grass	Seed
Soft rush	*Juncus effusus*	20%	2	FACW+	Grass	Seed
Deertongue	*Dichathelium Clandestinum*	20%	12	FACW	Grass	Seed
Alternate Species						
Rice Cutgrass	*Leersia oryzoides*			OBL	Grass	Seed
Wood Reed-Grass	*Cinna arundinacea*			FACW+	Grass	Seed

TEMPORARY SEEDING

The following table lists the temporary seed mix for the project site. All disturbed areas will be stabilized using mulch and temporary seed.

Common Name	Rate	Dates
WINTER WHEAT	130 LBS/ACRE	NOVEMBER TO APRIL
WINTER OR PERENNIAL RYE	130 LBS/ACRE	NOVEMBER TO APRIL
BROWN TOP MILLET	40 LBS/ACRE	APRIL TO AUGUST

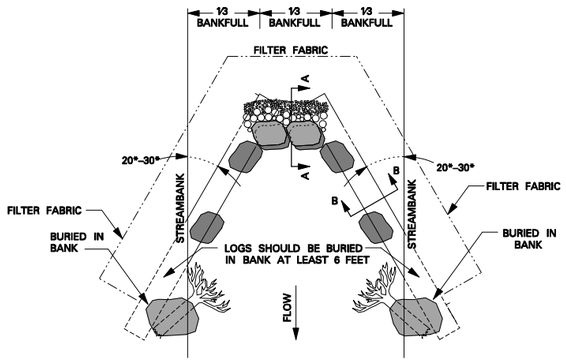
1/28/2018
1/28/2018
\\Charfs1\Vol8\Projects\Mining\Mine Projects\Consol\Buffalo Mountain\Design\Plan Views\Consol_BMSM_Plan Views_Design.dgn

PROJECT REFERENCE NO.	SHEET NO.
Buffalo Mtn. Surface Mine	2-A

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

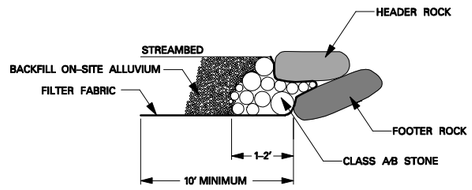
LOG CROSS VANE



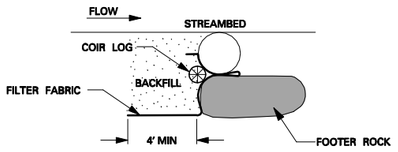
NOTES:

1. LOGS SHOULD BE AT LEAST 12 INCHES IN DIAMETER, RELATIVELY STRAIGHT, AND HARDWOOD.
2. CROSS LOGS SHOULD BE BURIED INTO BANK A MINIMUM OF 5 FEET.
3. VANE ARM LOGS SHOULD BE BURIED INTO THE BANK A MINIMUM OF 8 FEET.

PLAN VIEW

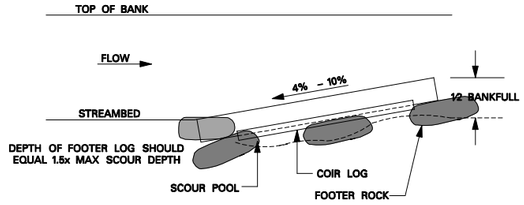


SECTION A – A



SECTION B – B

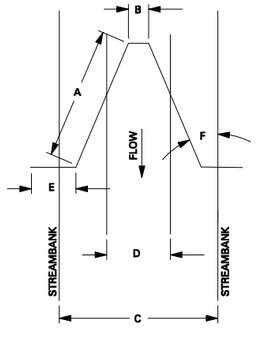
NOTES:
NAIL FILTER FABRIC TO TOP OF FOOTER LOG USING 3" 10d GALVANIZED COMMON NAIL ON 2' SPACING ALONG LOG.



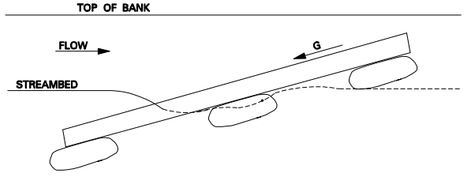
NOTE:
SET ELEVATION OF TOP OF LOGS CROSS PIECE TO DESIRED ELEVATION OF STREAMBED

ELEVATION VIEW

LOG CROSS VANE TYPICAL



PLAN VIEW

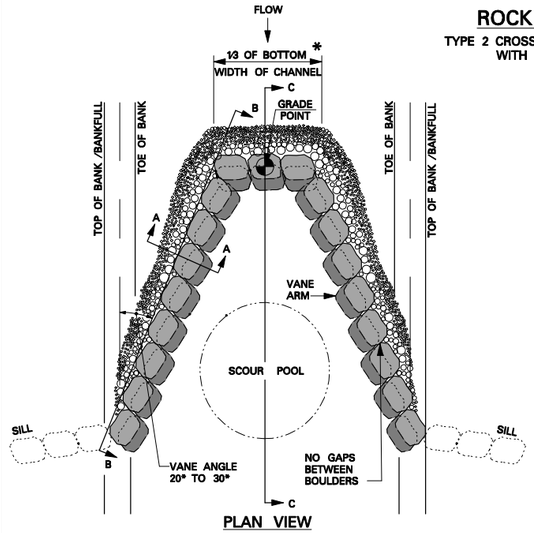


PROFILE VIEW

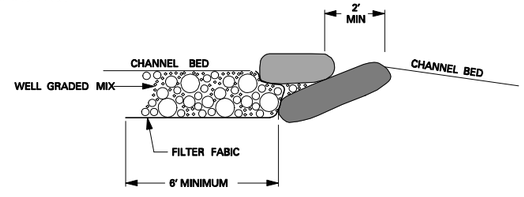
	REACH A	REACH B1&B2	REACH C	REACH D	REACH E
Vane Arm Length	10.8 ft	14.6 ft	16.0 ft	23.2 ft	17.6 ft
Invert Length	3.7 ft	5.0 ft	5.5 ft	7.9 ft	6.0 ft
Bankfull Width	11.1 ft	15.0 ft	16.4 ft	23.8 ft	18.0 ft
Bottom Width	6.5 ft	8.8 ft	9.5 ft	13.2 ft	10.3 ft
Sill Length	8.0 ft	8.0 ft	8.0 ft	8.0 ft	8.0 ft
Vane Arm Angle	20.0°	20.0°	20.0°	20.0°	20.0°
Vane Arm Slope	5.5%	5.5%	5.8%	5.7%	5.7%
Structure Length	10.2 ft	13.7 ft	15.0 ft	21.8 ft	16.5 ft

ROCK CROSS VANE TYPE 2

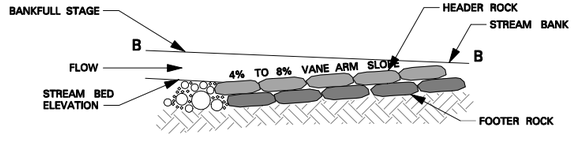
TYPE 2 CROSS VANE FOR GRAVEL/SAND BED STREAMS WITH DRAINAGE ARES LESS THAN 12mi



PLAN VIEW



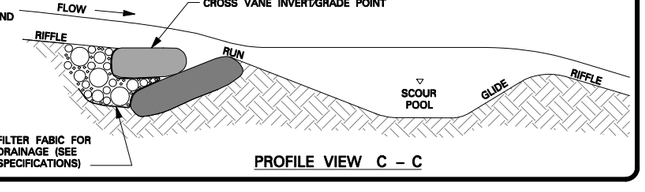
SECTION A – A



PROFILE VIEW B – B
VANE ARM

NOTES FOR ALL VANE STRUCTURES:

1. BOULDERS MUST BE AT LEAST 3' x 3' x 2'.
2. INSTALL FILTER FABRIC FOR DRAINAGE BEGINNING AT THE MIDDLE OF THE HEADER ROCKS AND EXTEND DOWNWARD TO THE DEPTH OF THE BOTTOM FOOTER ROCK, AND THEN UPSTREAM TO A MINIMUM OF SIX FEET.
3. DIG A TRENCH BELOW THE BED FOR FOOTER ROCKS AND PLACE FILL ON UPSTREAM SIDE OF VANE ARM, BETWEEN THE ARM AND STREAMBANK.
4. CONSTRUCT FOLLOWING ANGLE AND SLOPE SPECIFICATIONS.
5. USE CLASS 1 STONE TO FILL GAPS ON UPSTREAM SIDE OF BOULDERS, AND CLASS A STONE TO FILL GAPS ON UPSTREAM SIDE OF CLASS 1 STONE.
6. AFTER ALL STONE HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH ON-SITE ALLUVIUM TO THE ELEVATION OF ONE HALF THE HEADER ROCK.



PROFILE VIEW C – C

7/13/2021

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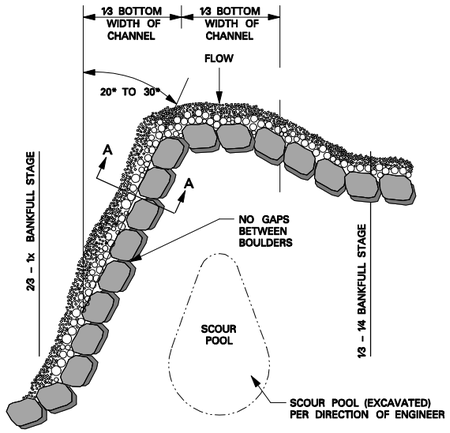
PROJECT REFERENCE NO.	SHEET NO.
Buffalo Mtn. Surface Mine	2-B

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

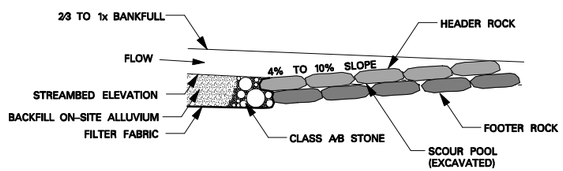
Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

GRADE CONTROL J-HOOK VANE

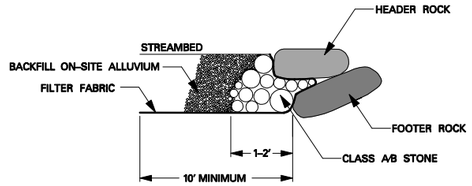
FOR SAND/GRAVEL BED SYSTEMS



PLAN VIEW



PROFILE VIEW

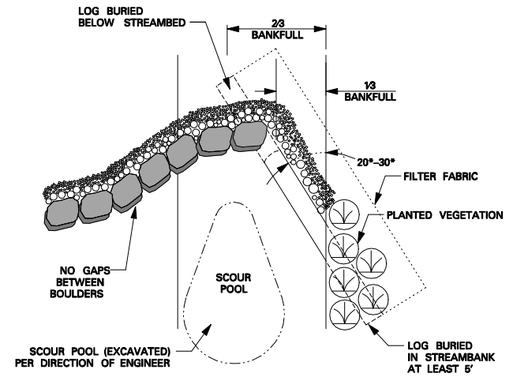


SECTION A – A

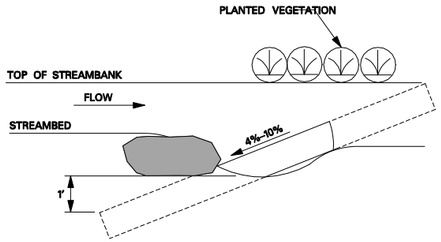
NOTES FOR ALL VANE STRUCTURES:

1. BOULDERS MUST BE AT LEAST 3' x 3' x 2'.
2. INSTALL FILTER FABRIC FOR DRAINAGE BEGINNING AT THE MIDDLE OF THE HEADER ROCKS AND EXTEND DOWNWARD TO THE DEPTH OF THE BOTTOM FOOTER ROCK, AND THEN UPSTREAM TO A MINIMUM OF TEN FEET.
3. DIG A TRENCH BELOW THE BED FOR FOOTER ROCKS AND PLACE FILL ON UPSTREAM SIDE OF VANE ARMS, BETWEEN THE ARMS AND STREAMBANK.
4. START AT BANK AND PLACE FOOTER ROCKS FIRST AND THEN HEADER (TOP) ROCK.
5. CONTINUE WITH STRUCTURE, FOLLOWING ANGLE AND SLOPE SPECIFICATIONS.
6. AN EXTRA BOULDER CAN BE PLACED IN SCOUR POOL FOR HABITAT IMPROVEMENT.
7. USE CLASS B STONE TO FILL GAPS ON UPSTREAM SIDE OF BOULDERS, AND CLASS A STONE TO FILL GAPS ON UPSTREAM SIDE OF CLASS B STONE.
8. AFTER ALL STONE HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH ON-SITE ALLUVIUM TO THE ELEVATION OF THE TOP OF THE HEADER ROCK.

GRADE CONTROL LOG J-HOOK



PLAN VIEW

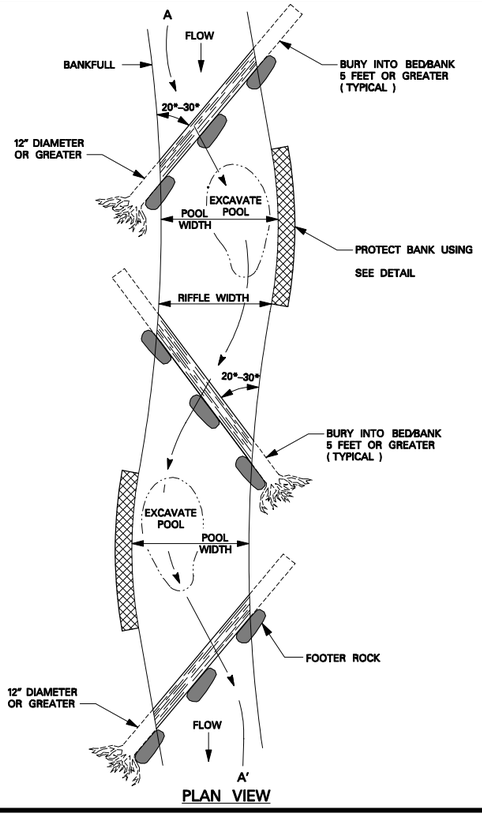


PROFILE VIEW

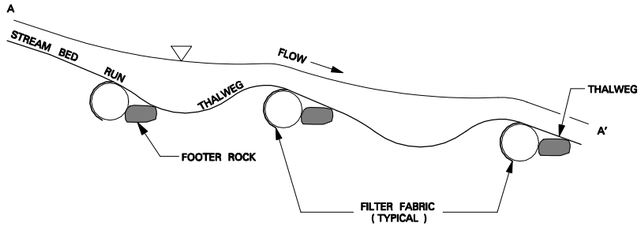
NOTES:

1. LOGS SHOULD BE AT LEAST 10" IN DIAMETER, RELATIVELY STRAIGHT, HARDWOOD, AND RECENTLY HARVESTED.
2. SOIL SHOULD BE COMPACTED WELL AROUND BURIED PORTIONS OF LOG.
3. TRANSPLANTS ARE PLACED ALONG THE TOP OF THE BANK OVER THE BURIED LOG VANE TO PROTECT AGAINST EROSION DURING HIGH FLOWS.
4. BOULDERS TO BE PLACED 1 TO 2 FEET APART.

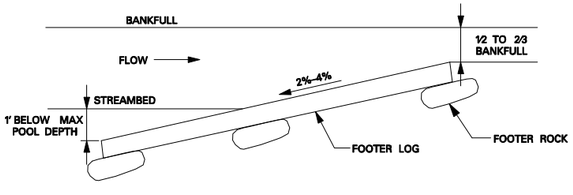
LOG STEP /POOL



PLAN VIEW



SECTION A – A'



PROFILE VIEW

NOTES:

1. LOGS WITHOUT ROOT MASS MAY BE USED IF APPROVED BY PROJECT ENGINEER.

12/11/2009

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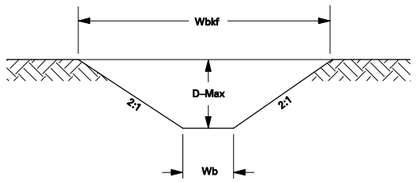
PROJECT REFERENCE NO.	SHEET NO.
Buffalo Mtn. Surface Mine	2

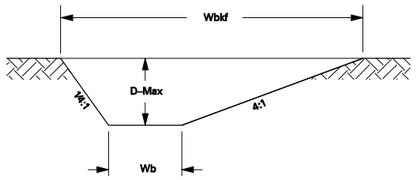
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

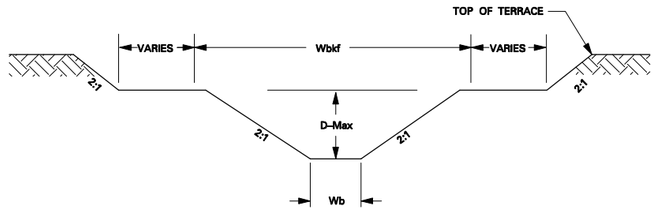
TYPICAL RIFFLE, POOL, AND BANKFULL BENCH CROSS SECTIONS



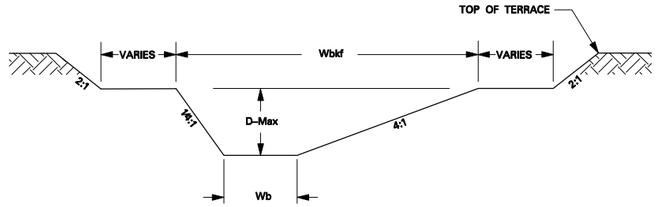
RIFFLE A–A



POOL B–B



RIFFLE WITH BANKFULL BENCH



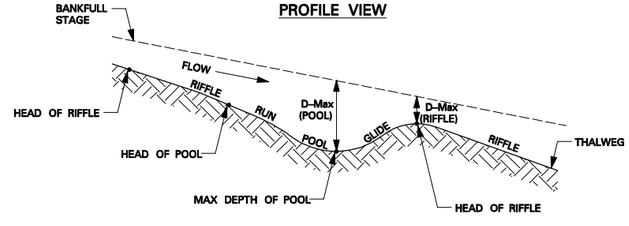
POOL WITH BANKFULL BENCH

	REACH A		REACH B1 & B2		REACH C		REACH D		REACH E	
	Riffle	Pool	Riffle	Pool	Riffle	Pool	Riffle	Pool	Riffle	Pool
Width of Bankfull (Wbkf)	11.3	16.7	15.2	22.5	16.5	24.6	22.9	35.8	17.9	26.9
Average Depth	0.9	1.9	1.3	2.6	1.4	2.8	1.9	4.1	1.5	3.1
Maximum Depth (D-Max)	1.2	3.2	1.6	4.4	1.7	4.8	2.4	7.0	1.9	5.2
Width to Depth Ratio (bkf W/D)	12.0	8.8	12.0	8.7	12.0	8.8	12.0	8.7	12.0	8.8
Bankfull Area (Abkf)	10.7	31.7	19.3	57.9	22.6	69.1	43.6	146.5	26.7	82.4
Bottom Width (Wb)	6.5	3.1	8.8	3.8	9.5	4.2	13.2	6.1	10.3	4.8

NOTES:
1. DURING CONSTRUCTION CORNERS OF DESIGN CHANNEL WILL BE ROUNDED AND A THALWEG WILL BE SHAPED PER DIRECTION OF ENGINEER.
2. POOLS SHOWN ABOVE ARE LEFT POOLS ONLY.

TYPICAL PROFILE

PROFILE VIEW



NOTES:

1. THE POINTS SHOWN, e.g. HEAD OF RIFFLE, HEAD OF POOL AND MAX DEPTH OF POOL ARE THE CONTROL POINTS USED TO CUT THE PROFILE; HOWEVER, THE CONTRACTOR SHOULD CREATE SMOOTH TRANSITIONS BETWEEN CONTROL POINTS AS SHOWN ABOVE.
2. USE THE FACET SLOPES IN THE TABLE AS A GUIDE TO ENSURE THAT THE FEATURES ARE APPROPRIATELY GRADED.
3. THE HEAD OF RIFFLE ELEVATION SHOULD NOT EXCEED THE HEAD OF POOL ELEVATION.
4. THE CHANGE IN WIDTH BETWEEN THE RIFFLES AND POOLS SHOULD OCCUR GRADUALLY OVER THE ENTIRE LENGTH OF THE BEND.

12/11/2009
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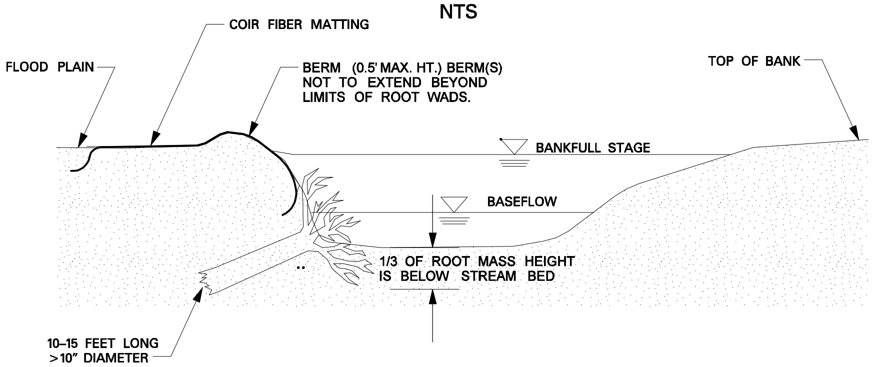
PROJECT REFERENCE NO.	SHEET NO.
Buffalo Mtn. Surface Mine	2-C

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

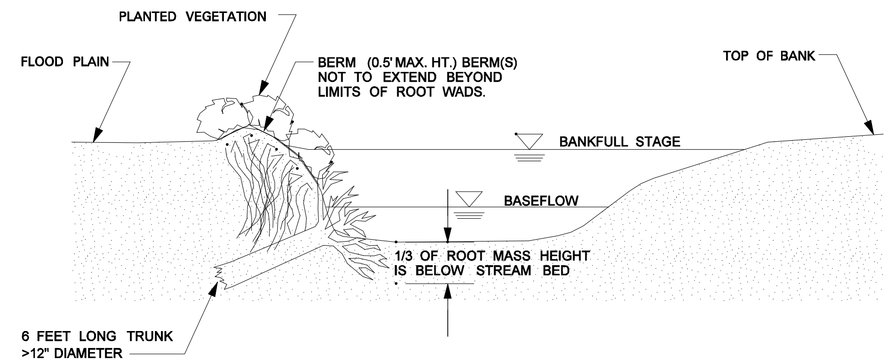
ROOT WADS WITHOUT TRANSPLANTS

CROSS SECTION VIEW
NTS



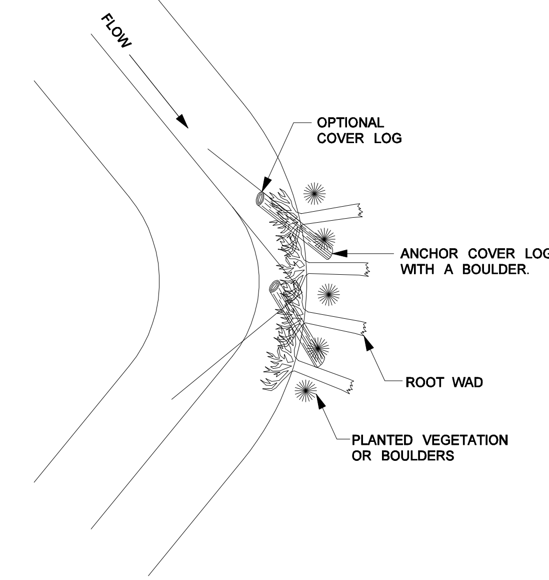
ROOT WADS WITH TRANSPLANTS

CROSS SECTION VIEW
NTS



ROOT WADS

PLAN VIEW
NTS



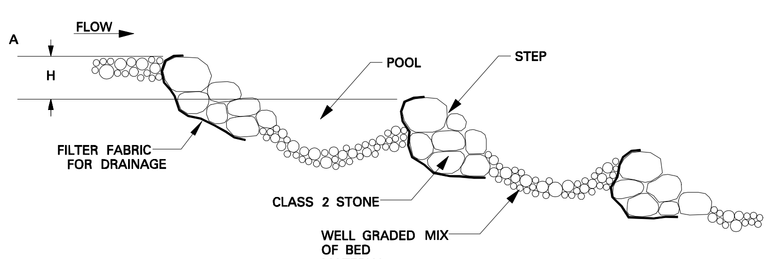
NOTES:

TRENCHING METHOD:
IF THE ROOT WAD CANNOT BE DRIVEN INTO THE BANK OR THE BANK NEEDS TO BE RECONSTRUCTED, THE TRENCHING METHOD SHOULD BE USED. THIS METHOD REQUIRES THAT A TRENCH BE EXCAVATED FOR THE LOG PORTION OF THE ROOT WAD. IN THIS CASE, A FOOTER LOG SHOULD BE INSTALLED UNDERNEATH THE ROOT WAD IN A TRENCH EXCAVATED PARALLEL TO THE BANK AND WELL BELOW THE STREAMBED. ONE-THIRD OF THE ROOT WAD SHOULD REMAIN BELOW NORMAL BASE FLOW CONDITIONS.

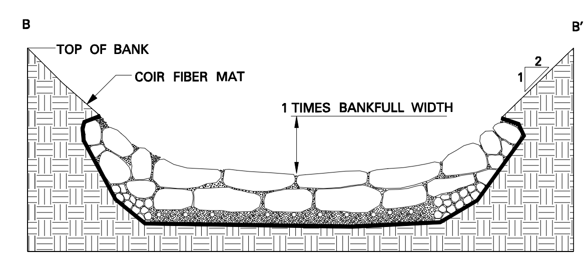
NOTES:

DRIVE POINT METHOD:
SHARPEN THE END OF THE LOG WITH A CHAINSAW BEFORE "DRIVING" IT INTO THE BANK. ORIENT ROOT WADS UPSTREAM SO THAT THE STREAM FLOW MEETS THE ROOT WAD AT A 90-DEGREE ANGLE, DEFLECTING THE WATER AWAY FROM THE BANK. A TRANSPLANT OR BOULDER SHOULD BE PLACED ON THE DOWNSTREAM SIDE OF THE ROOT WAD IF A BACK EDDY IS FORMED BY THE ROOT WAD. THE BOULDER SHALL BE APPROXIMATELY 4'X 3'X 2'.

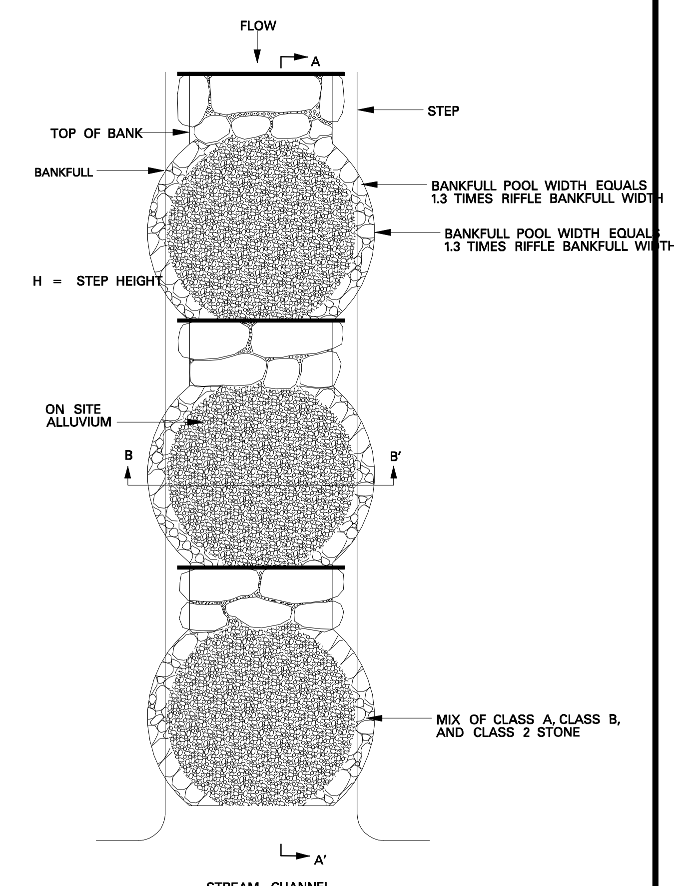
STEP POOL CHANNEL



PROFILE VIEW A–A'



CROSS SECTION B–B'



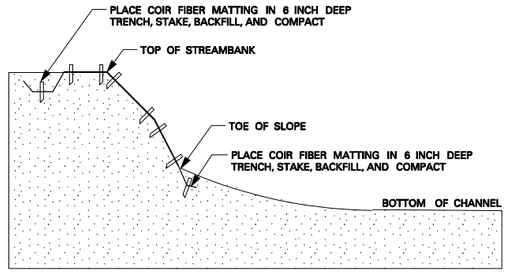
PLAN VIEW

PROJECT REFERENCE NO.	SHEET NO.
Buffalo Mtn. Surface Mine	2-D

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

EROSION CONTROL MATTING



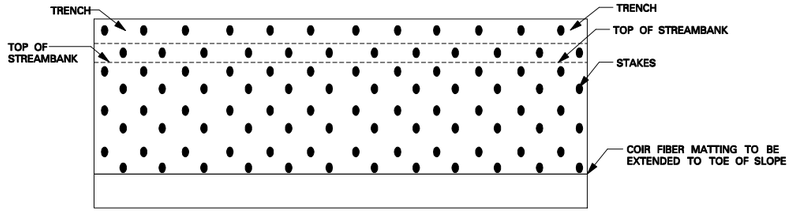
CROSS SECTION VIEW

NOTES:
1. BANKS SHOULD BE SEEDED PRIOR TO PLACEMENT OF MATTING.
2. PLACE COIR FIBER MATTING ACCORDING TO MANUFACTURER RECOMMENDATIONS.
3. MATTING STAKES SHOULD BE PLACED IN A DIAMOND SHAPED PATTERN.

TYPICAL MATTING STAKE

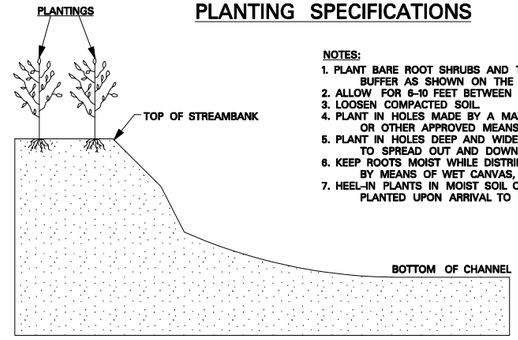
THE WOOD STAKE SHALL BE THE NORTH AMERICAN GREEN ECO-STAKE OR APPROVED EQUAL WITH THE FOLLOWING DIMENSIONS:

LEG LENGTH	11.00 IN (27.94 CM)
HEAD WIDTH	1.25 IN (3.18 CM)
HEAD THICKNESS	0.40 IN (1.02 CM)
LEG WIDTH	0.60 IN (1.52 CM) (TAPERED TO POINT)
LEG THICKNESS	0.40 IN (1.02 CM)
TOTAL LENGTH	12.00 IN (30.48 CM)



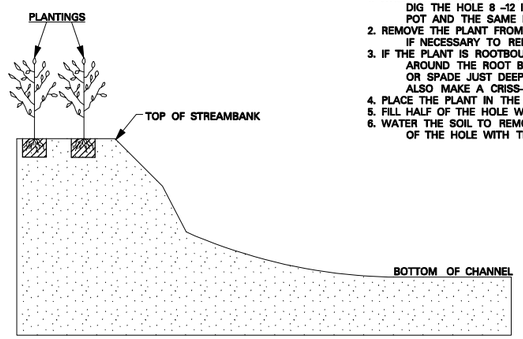
PLAN VIEW

PLANTING SPECIFICATIONS



CROSS SECTION VIEW OF BARE ROOT PLANTING

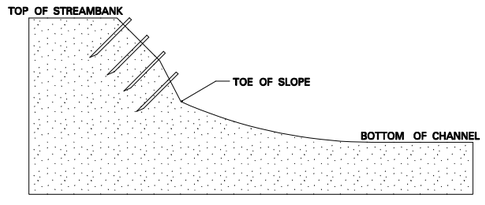
NOTES:
1. PLANT BARE ROOT SHRUBS AND TREES TO THE WIDTH OF THE BUFFER AS SHOWN ON THE PLANS.
2. ALLOW FOR 6-10 FEET BETWEEN PLANTINGS, DEPENDING ON SIZE.
3. LOOSEN COMPACTED SOIL.
4. PLANT IN HOLES MADE BY A MATTOCK, DIBBLE, PLANTING BAR, OR OTHER APPROVED MEANS.
5. PLANT IN HOLES DEEP AND WIDE ENOUGH TO ALLOW THE ROOTS TO SPREAD OUT AND DOWN WITHOUT J-ROOTING.
6. KEEP ROOTS MOIST WHILE DISTRIBUTING OR WAITING TO PLANT BY MEANS OF WET CANVAS, BURLAP, OR STRAW.
7. HEEL-IN PLANTS IN MOIST SOIL OR SAWDUST IF NOT PROMPTLY PLANTED UPON ARRIVAL TO PROJECT SITE.



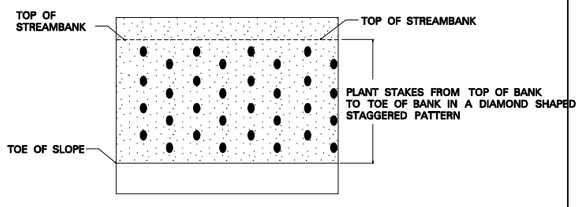
CROSS SECTION VIEW OF CONTAINER PLANTING

NOTES:
1. WHEN PREPARING THE HOLE FOR A POTTED PLANT OR SHRUB DIG THE HOLE 8 -12 INCHES LARGER THAN THE DIAMETER OF THE POT AND THE SAME DEPTH AS THE POT.
2. REMOVE THE PLANT FROM THE POT. LAY THE PLANT ON ITS SIDE IF NECESSARY TO REMOVE THE POT.
3. IF THE PLANT IS ROOTBOUND (ROOTS GROWING IN A SPIRAL AROUND THE ROOT BALL), MAKE VERTICAL CUTS WITH A KNIFE OR SPADE JUST DEEP ENOUGH TO CUT THE NET OF ROOTS. ALSO MAKE A CRISS-CROSS CUT ACROSS THE BOTTOM OF THE BALL.
4. PLACE THE PLANT IN THE HOLE.
5. FILL HALF OF THE HOLE WITH SOIL (SAME SOIL REMOVED FOR BACKFILL).
6. WATER THE SOIL TO REMOVE AIR POCKETS AND FILL THE REST OF THE HOLE WITH THE REMAINING SOIL.

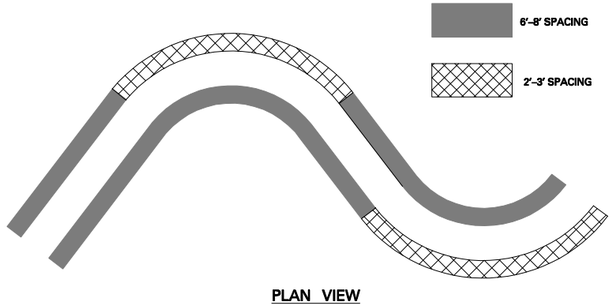
LIVE STAKING



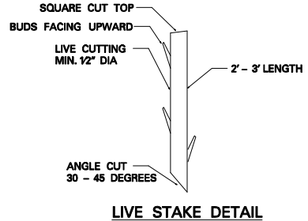
CROSS SECTION VIEW



PLAN VIEW



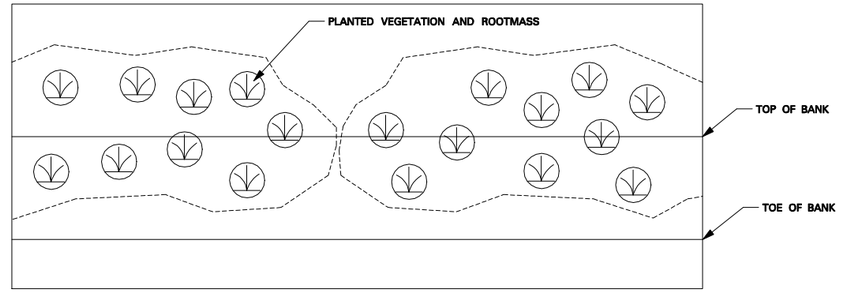
PLAN VIEW



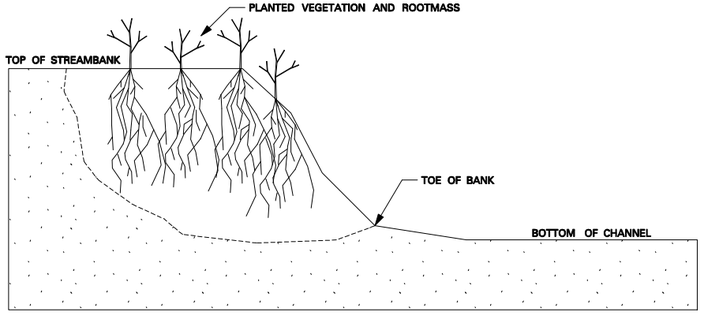
LIVE STAKE DETAIL

NOTES:
1. STAKES SHOULD BE CUT AND INSTALLED ON THE SAME DAY.
2. DO NOT INSTALL STAKES THAT HAVE BEEN SPLIT.
3. STAKES MUST BE INSTALLED WITH BUDS POINTING UPWARDS.
4. STAKES SHOULD BE INSTALLED PERPENDICULAR TO BANK.
5. STAKES SHOULD BE 1/2 TO 2 INCHES IN DIAMETER AND 2 TO 3 FT LONG.
6. STAKES SHOULD BE INSTALLED LEAVING 1/3 OF STAKE ABOVE GROUND.

PLANTED VEGETATION



PLAN VIEW



CROSS SECTION VIEW

NOTES:
1. EXCAVATE A HOLE IN THE BANK TO BE STABILIZED THAT WILL ACCOMMODATE THE SIZE OF TRANSPLANT TO BE PLACED. BEGIN EXCAVATION AT THE TOE OF THE BANK.
2. EXCAVATE TRANSPLANT USING A FRONT END LOADER. EXCAVATE THE ENTIRE ROOT MASS AND AS MUCH ADDITIONAL SOIL MATERIAL AS POSSIBLE. IF ENTIRE ROOT MASS CANNOT BE EXCAVATED IN ONE BUCKET LOAD, THE TRANSPLANT IS TOO LARGE AND ANOTHER SHOULD BE SELECTED.
3. PLACE TRANSPLANT IN THE BANK TO BE STABILIZED SO THAT VEGETATION IS ORIENTATED VERTICALLY.
4. FILL IN ANY HOLES AROUND THE TRANSPLANT AND COMPACT.
5. ANY LOOSE SOIL LEFT IN THE STREAM SHOULD BE REMOVED.
6. PLACE MULTIPLE TRANSPLANTS CLOSE TOGETHER SUCH THAT THEY TOUCH.

PROJECT REFERENCE NO.	SHEET NO.
Buffalo Mtn. Surface Mine	2-E

PRELIMINARY PLANS
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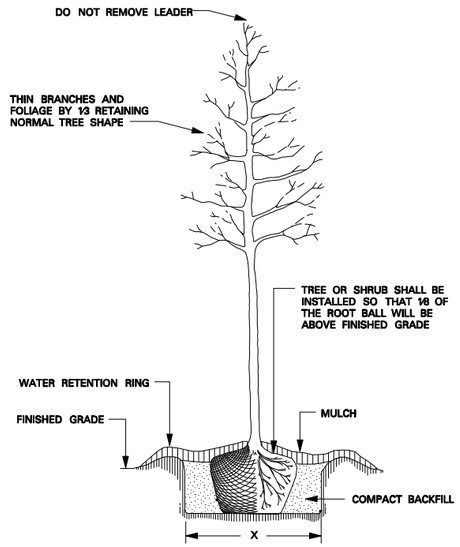
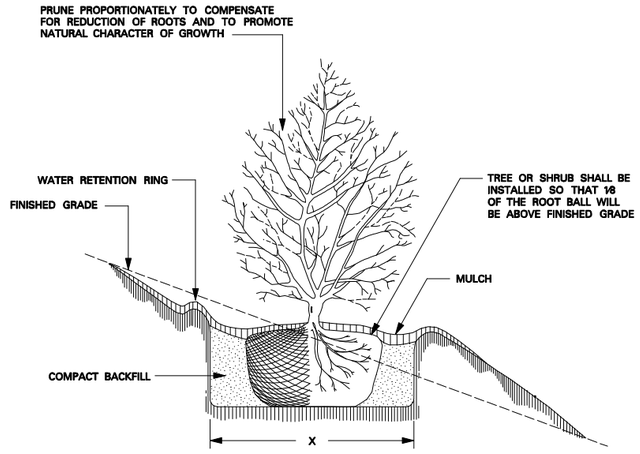
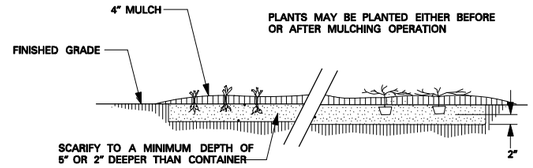
Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822



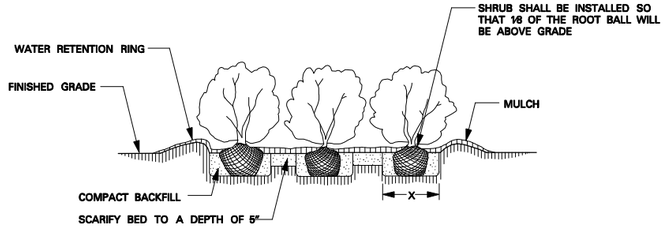
TREE OR SHRUB PLANTING DETAIL
GROUND LEVEL



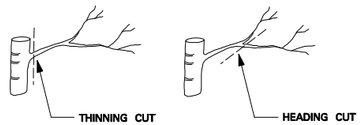
TREE OR SHRUB PLANTING DETAIL
SLOPING GROUND



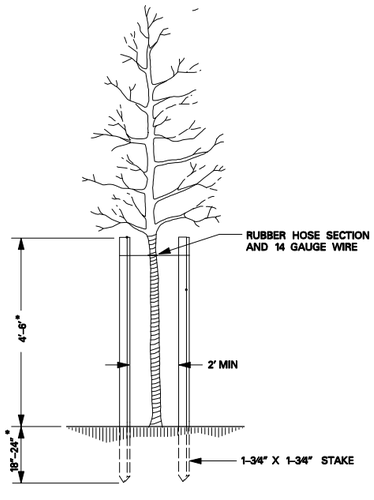
GROUNDCOVER PLANTING DETAIL



SHRUB BED PLANTING DETAIL



PRUNING CUTS

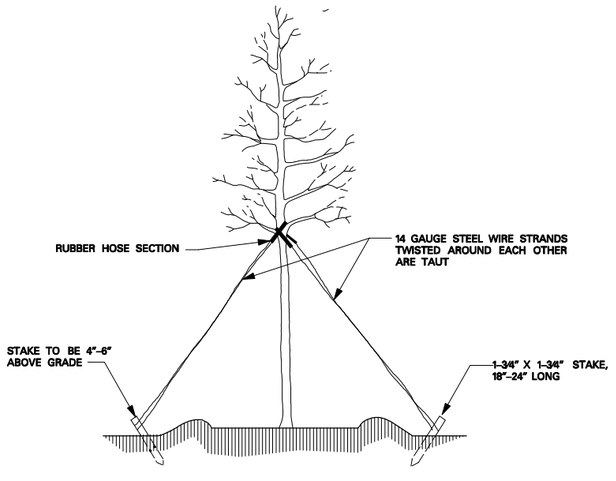


STAKING DETAIL FOR TREES 6' TO 10' TALL

NOTE:
UTILIZE STAKING DETAIL ONLY IF REQUESTED BY THE ENGINEER.

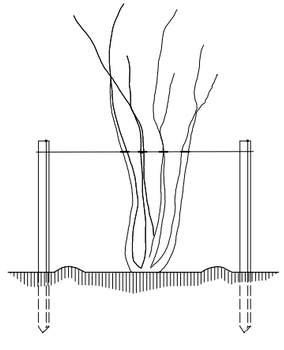
PLAN VIEW

* EXACT LENGTH WITHIN INDICATED RANGE TO BE DETERMINED BY ENGINEER IN THE FIELD.



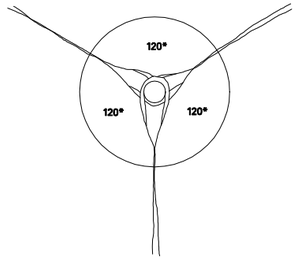
TREE GUYING DETAIL FOR TREES 10' OR TALLER

NOTE:
UTILIZE GUYING DETAIL ONLY IF REQUESTED BY THE ENGINEER.

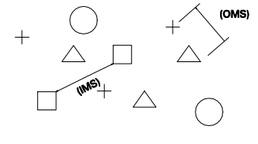


GUYING & STAKING

NOTES:
1. SCHEDULE FOR PLANT HOLE SIZE: CONTAINER OR ROOT BALL SIZE X = 2 TIMES THE DIAMETER OF THE CONTAINER OR THE ROOT BALL DIAMETER
2. FERTILIZER SHALL BE APPLIED AT THE TIME OF PLANTING. FERTILIZER SHALL BE A SLOW RELEASE PELLET OR TABLET.FORMULATION SHALL BE APPROVED BY ENGINEER.
3. RATES SHALL BE PER MANUFACTURERS RECOMMENDATIONS AND APPROVED BY THE ENGINEER.THOROUGHLY MIX WITH TOPSOIL, BACKFILL OR SCARIFIED SOIL.
4. REMOVE BURLAP FROM TOP OF BALL BEFORE BACKFILLING AROUND BALL IS COMPLETE.

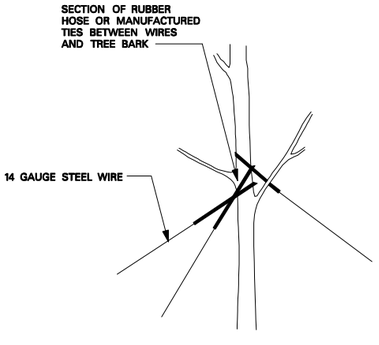


GUY SPACING DETAIL



RANDOM PLANT SPACING DETAIL–PLAN VIEW

1. AN OVERALL MINIMUM SPACING DISTANCE (OMS) IS ASSIGNED TO THE PLANTING CONFIGURATION (SEE PLANT SCHEDULE).
2. AN INDIVIDUAL MINIMUM SPACING DISTANCE (IMS) IS ASSIGNED TO EACH INDIVIDUAL SPECIES (SEE PLANT SCHEDULE).



GUY TYING DETAIL

PROJECT REFERENCE NO.	SHEET NO.
Buffalo Mtn. Surface Mine	2-F

PRELIMINARY PLANS
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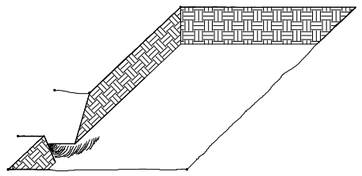
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

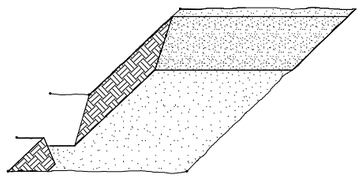
SEEDLING / LINER BAREROOT PLANTING DETAIL

HEALING IN

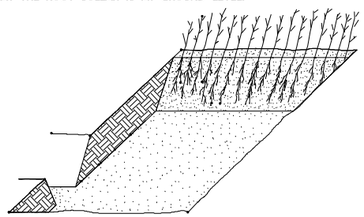
1. LOCATE A HEALING-IN SITE IN A SHADY, WELL PROTECTED AREA.
2. EXCAVATED A FLAT BOTTOM TRENCH 12 INCHES DEEP AND PROVIDE DRAINAGE.



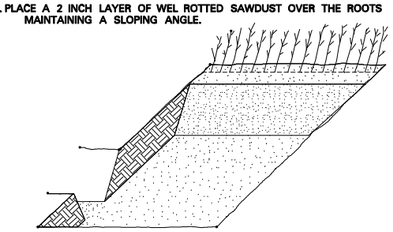
3. BACKFILL THE TRENCH WITH 2 INCHES OF WELL ROTTED SAWDUST. PLACE A 2 INCH LAYER OF WELL ROTTED SAWDUST AT A SLOPING ANGLE AT ONE END OF THE TRENCH.



4. PLACE A SINGLE LAYER OF PLANTS AGAINST THE SLOPING END SO THAT THE ROOT COLLAR IS AT GROUND LEVEL.

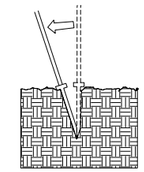


5. PLACE A 2 INCH LAYER OF WEL ROTTED SAWDUST OVER THE ROOTS MAINTAINING A SLOPING ANGLE.

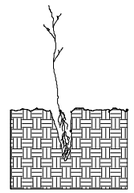


6. REPEAT LAYERS OF PLANTS AND SAWDUST AS NECESSARY AND WATER THOROUGHLY.

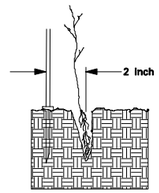
DIBBLE PLANTING METHOD USING THE KBC PLANTING BAR



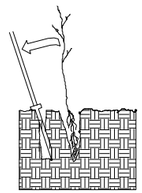
1. INSERT PLANTING BAR AS SHOWN AND PULL HANDLE TOWARD PLANTER.



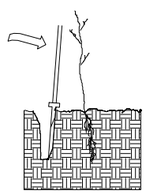
2. REMOVE PLANTING BAR AND PLACESEEDING AT CORRECT DEPTH.



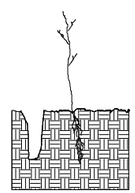
3. INSERT PLANTING BAR 2 INCHES TOWARD PLANTER FROM SEEDING.



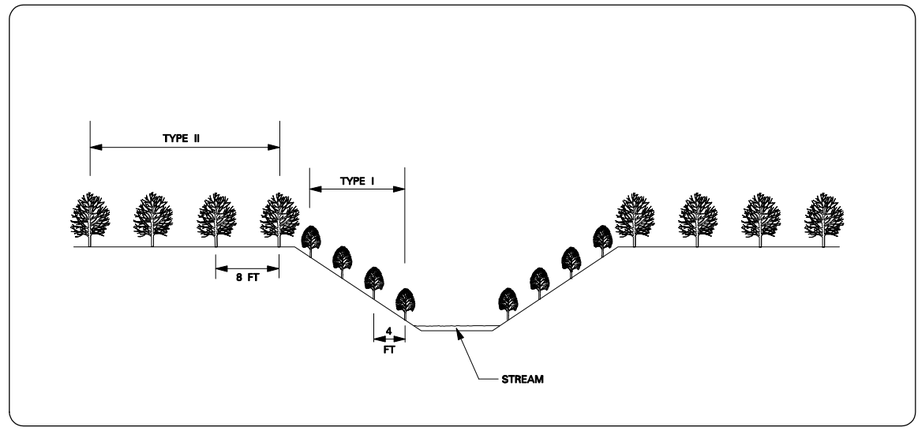
4. PULL HANDLE OF BAR TOWARD PLANTER, FIRMING SOIL AT BOTTOM.



5. PUSH HANDLE FORWARD FIRMING SOIL AT TOP.



6. LEAVE COMPATION HOLE OPEN. WATER THOROUGHLY.



PLANTING NOTES:

PLANTING BAG

DURING PLANTING, SEEDLINGS SHALL BE KEPT IN A MOIST CANVAS BAG OR SIMILAR CONTAINER TO PREVENT THE ROOT SYSTEMS FROM DRYING.

KBC PLANTING BAR

PLANTING BAR SHALL HAVE A BLADE WITH A TRIANGULAR CROSS SECTION, AND SHALL BE 12 INCHES LONG, 4 INCHES WIDE AND 1 INCH THICK AT CENTER.

ROOT PRUNING

ALL SEEDLINGS SHALL BE ROOT PRUNED, IF NECESSARY, SO THAT NO ROOTS EXTEND MORE THAN 10 INCHES BELOW THE ROOT COLLAR.

SEE PLAN SHEETS FOR AREAS TO BE PLANTED

7/13/2009

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7/13/2009

PROJECT REFERENCE NO.	SHEET NO.
Buffalo Mtn. Surface Mine	2-G

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

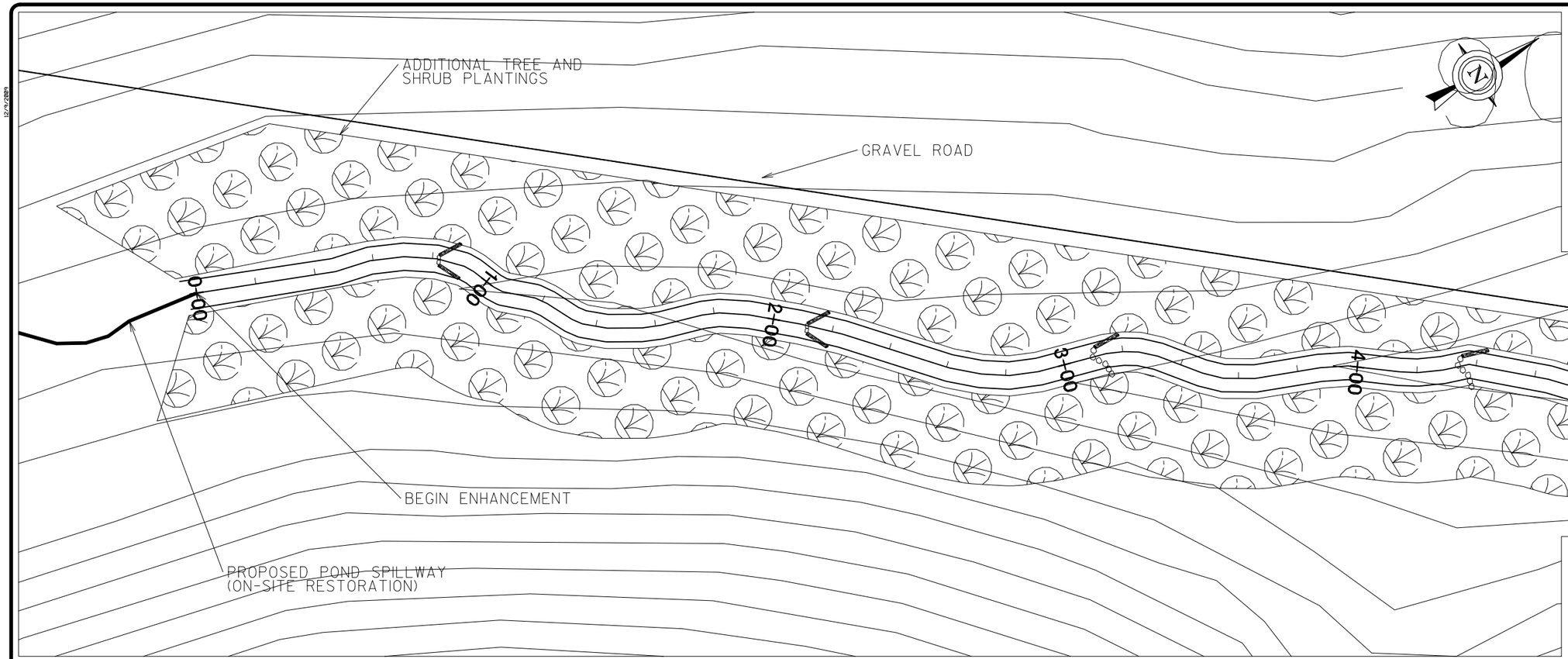
Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

QUANTITIES TO BE DETERMINED DURING FINAL CONSTRUCTION

Description	Quantity	Unit
Mobilization & Demobilization	X	LS
Construction Survey and Quality Control	X	LS
Access Road Construction & Rip–rap Fork Crossing Installations	X	EACH
Clearing and Grubbing	X	LS
Rip–rap Ford Crossing Installation	X	EACH
Stream Restoration		
Excavation–Total	X	CY
Debris Removal	X	LS
Silt Fence/Temporary Sediment Controls (i.e. Hay bales)	X	LS
Creation of Bankfull Benches	X	LS
Rock Cross Vanes	X	EACH
Double Drop Rock Cross Vanes	X	EACH
Log/Rock J–Hook Vanes	X	EACH
Rock J–Hook Vanes	X	EACH
Log Step Pools	X	EACH
Rock Step Pools	X	EACH
Rootwad Sets (1–5 individuals per set)	X	EACH
Revegetation Erosion Control/Seed Bank Matting	X	ACRE
Live Stakes	X	EACH
Bareroots	X	EACH
Hydroseeding	X	ACRE
Monitoring Structures Cement (80lb bags)	X	BAGS
Rebar	X	FT
Warranty	X	LS
Other:		

PRELIMINARY DESIGN CRITERIA

	Reach A		Reach B2		Reach C		Reach D		Reach E	
Parameter	**MIN**	**MAX**	**MIN**	**MAX**	**MIN**	**MAX**	**MIN**	**MAX**	**MIN**	**MAX**
Drainage Area, DA (sq mi)	0.60		1.25		1.53		3.47		1.88	
Stream Type (Rosgen)	B4		B4		B4		B4		B4	
Bankfull Discharge, Qbkf (cfs)	51	51	90	90	106	106	203	203	125	125
Bankfull Riffle XSEC Area, Abkf (sq ft)	10.7	10.7	19.3	19.3	22.6	22.6	43.6	43.6	26.7	26.7
Bankfull Mean Velocity, Vbkf (ft/s)	4.8	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
Bankfull Riffle Width, Wbkf (ft)	11.3	11.3	15.2	15.2	16.5	16.5	22.9	22.9	17.9	17.9
Bankfull Riffle Mean Depth, Dbkf (ft)	0.9	0.9	1.3	1.3	1.4	1.4	1.9	1.9	1.5	1.5
Width to Depth Ratio, W/D (ft/ft)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Width Floodprone Area, Wfpa (ft)	16	30	20	40	24	42	30	60	26	48
Entrenchment Ratio, Wfpa/Wbkf (ft/ft)	1.4	2.6	1.3	2.6	1.5	2.6	1.3	2.6	1.5	2.7
Riffle Max Depth @ bkf, Dmax (ft)	1.0	1.0	1.4	1.4	1.5	1.5	2.1	2.1	1.6	1.6
Riffle Max Depth Ratio, Dmax/Dbkf	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Max Depth @ tob, Dmaxtob (ft)	1.0	1.0	1.4	1.4	1.5	1.5	2.1	2.1	1.6	1.6
Bank Height Ratio, Dtob/Dmax (ft/ft)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Sinuosity, K	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Valley Slope, Sval (ft/ft)	0.0208	0.0208	0.0208	0.0208	0.0198	0.0198	0.0298	0.0298	0.0235	0.0235
Channel Slope, Schan (ft/ft)	0.0208	0.0208	0.0208	0.0208	0.0198	0.0198	0.0298	0.0298	0.0235	0.0235
Slope Riffle, Srif (ft/ft)	0.0250	0.0250	0.0229	0.0374	0.0218	0.0356	0.0328	0.0536	0.0259	0.0423
Riffle Slope Ratio, Srif/Schan	1.2	1.2	1.1	1.8	1.1	1.8	1.1	1.8	1.1	1.8
Slope Pool, Spool (ft/ft)	0.0000	0.0083	0.0000	0.0083	0.0000	0.0079	0.0000	0.0119	0.0000	0.0094
Pool Slope Ratio, Spool/Schan	0.00	0.40	0.00	0.40	0.00	0.40	0.00	0.40	0.00	0.40
Pool Max Depth, Dmaxpool (ft)	1.9	3.3	2.5	4.4	2.7	4.8	3.8	6.7	3.0	5.2
Pool Max Depth Ratio, Dmaxpool/Dbkf	2.0	3.5	2.0	3.5	2.0	3.5	2.0	3.5	2.0	3.5
Pool Width, Wpool (ft)	12.5	17.0	16.7	22.8	18.1	24.7	25.2	34.3	19.7	26.8
Pool Width Ratio, Wpool/Wbkf	1.10	1.50	1.10	1.50	1.10	1.50	1.10	1.50	1.10	1.50
Pool Width/Depth Ratio	6.60	5.14	6.60	5.14	6.60	5.14	6.60	5.14	6.60	5.14
Pool Area, Apool, (ft/ft)	13.91	21.40	25.09	38.60	24.86	27.12	47.96	52.32	34.71	53.40
Pool Area Ratio, Apool/Abkf	1.30	2.00	1.30	2.00	1.10	1.20	1.10	1.20	1.30	2.00
Riffle Length, Lriffle (ft)	11.3	34.0	15.2	45.7	16.5	49.4	22.9	68.6	17.9	53.7
Riffle Length Ratio, Lriffle/Wbkf (ft)	1.0	3.0	1.0	3.0	1.0	3.0	1.0	3.0	1.0	3.0
Pool Length, Lpool (ft)	5.7	17.0	7.6	22.8	8.2	24.7	11.4	34.3	8.9	26.8
Pool Length Ratio, Lpool/Wbkf (ft)	0.5	1.5	0.5	1.5	0.5	1.5	0.5	1.5	0.5	1.5
Pool-Pool Spacing, Lps (ft)	17.0	56.7	22.8	76.1	24.7	82.3	34.3	114.4	26.8	89.5
Pool-Pool Spacing Ratio, Lps/Wbkf	1.50	5.00	1.50	5.00	1.50	5.00	1.50	5.00	1.50	5.00
d16 (mm)	17.0		17.0		17.0		17.0		17.0	
d35 (mm)	29.0		29.0		29.0		29.0		29.0	
d50 (mm)	46.0		46.0		46.0		46.0		46.0	
d84 (mm)	110.0		110.0		110.0		110.0		110.0	
d95 (mm)	160.0		160.0		160.0		160.0		160.0	



PROJECT REFERENCE NO.	SHEET NO.
BUFFALO MTN. SURFACE MINE	3

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

APPROVED BY:

DATE:

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

PLAN AND PROFILE

10 10 0 20 40
SCALE (FT)

PROPOSED ELEVATIONS

PROFILE TO BE DESIGNED
UPON FINAL CONSTRUCTION

EXISTING ELEVATIONS

12/4/2009

\\Charfs1\Vol6\Projects\Mining\Mine_Projects\Consol\Buffalo_Mountain\CMP\Plan_Views\Const\0804-BM.dgn

PROJECT REFERENCE NO.	SHEET NO.
BUFFALO MTN. SURFACE MINE	4

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

APPROVED BY:

DATE:

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

GRAVEL ROAD

5-00
6-00
7-00
8-00
9-00
9-00

MATCHLINE SEE SHEET 5

REACH A

PLAN AND PROFILE

10 10 0 20 40
SCALE (FT)

PROPOSED ELEVATIONS

PROFILE TO BE DESIGNED
UPON FINAL CONSTRUCTION

EXISTING ELEVATIONS

12/4/2009

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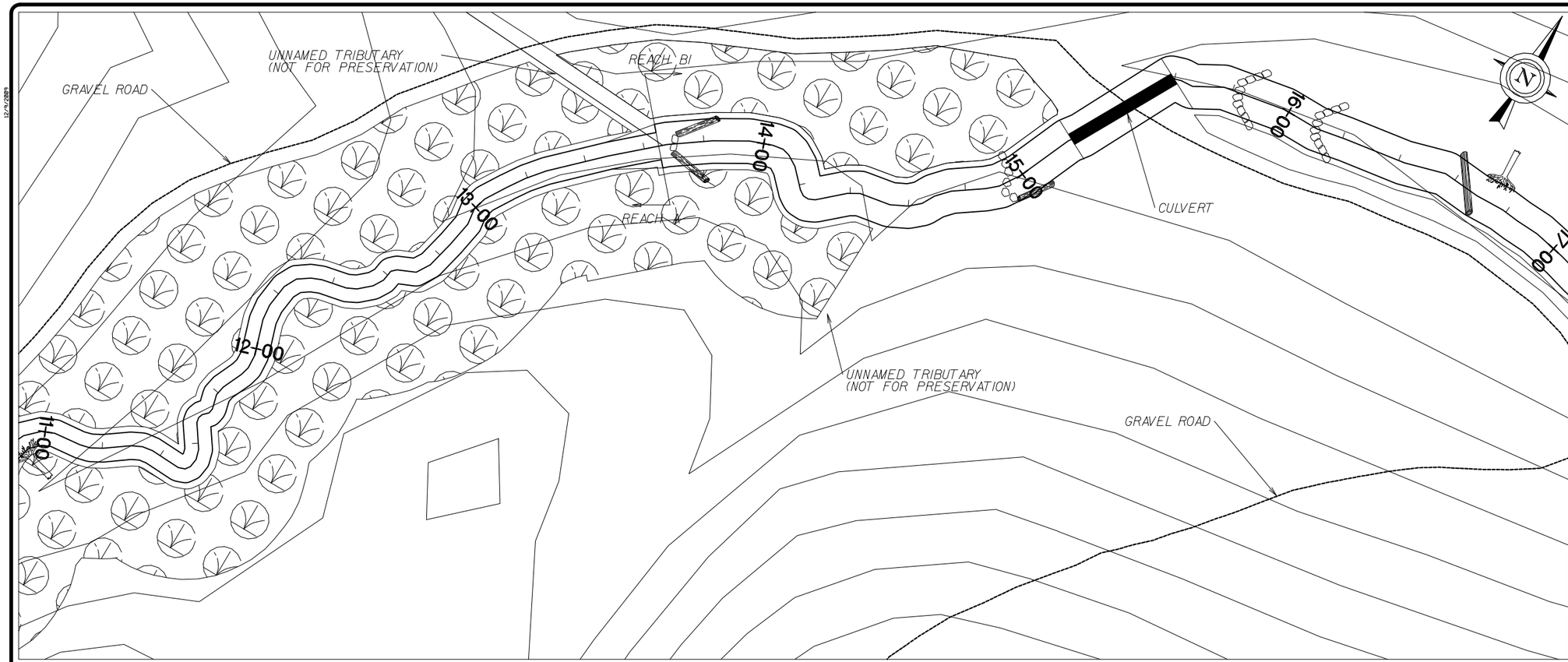


PROJECT REFERENCE NO.	SHEET NO.
BUFFALO MTN. SURFACE MINE	5

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

APPROVED BY:

DATE:

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

MATCHLINE SEE SHEET 6

REACH A & B1

PLAN AND PROFILE

10 10 0 20 40
SCALE (FT)

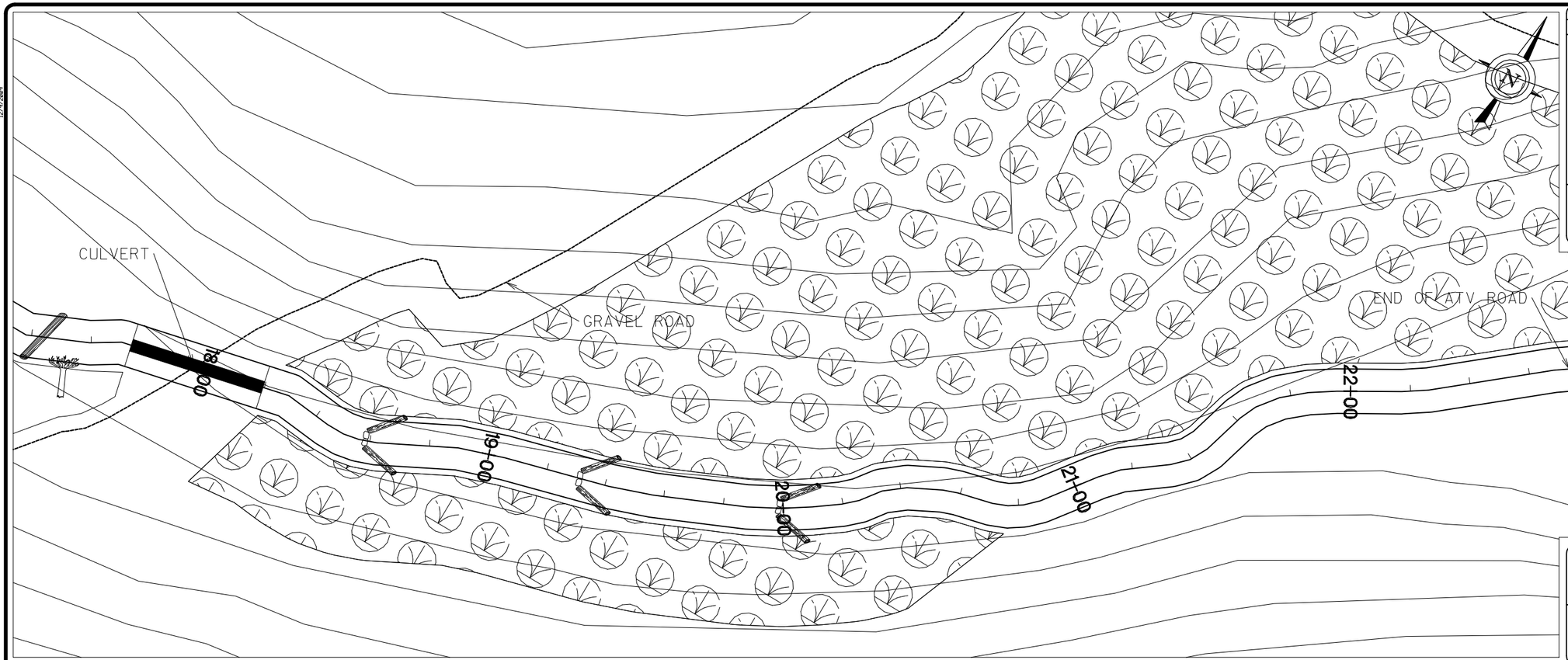
PROPOSED ELEVATIONS

PROFILE TO BE DESIGNED
UPON FINAL CONSTRUCTION

EXISTING ELEVATIONS

12/4/2009

\\Charfs1\Vol6\Projects\Mining\Mine_Projects\Const\Buffalo Mountain\CMP\Plan Views\Const\BMSS-BM_plan_sdgn



PROJECT REFERENCE NO.	SHEET NO.
BUFFALO MTN. SURFACE MINE	6

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

APPROVED BY:

DATE:

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

PLAN AND PROFILE

10 10 0 20 40
SCALE (FT)

PROPOSED ELEVATIONS

PROFILE TO BE DESIGNED
UPON FINAL CONSTRUCTION

EXISTING ELEVATIONS

12/4/2009

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PROJECT REFERENCE NO.	SHEET NO.
BUFFALO MTN. SURFACE MINE	7

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

APPROVED BY:

DATE:

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

GRAVEL ROAD

24+00

25+00

26+00

27+00

28+00

ATV ROAD

LUT I OF THE RIGHT FORK OF
HELL CREEK TO BE PRESERVED

MATCHLINE SEE SHEET 8

REACH B1

PLAN AND PROFILE

10 10 0 20 40
SCALE (FT)

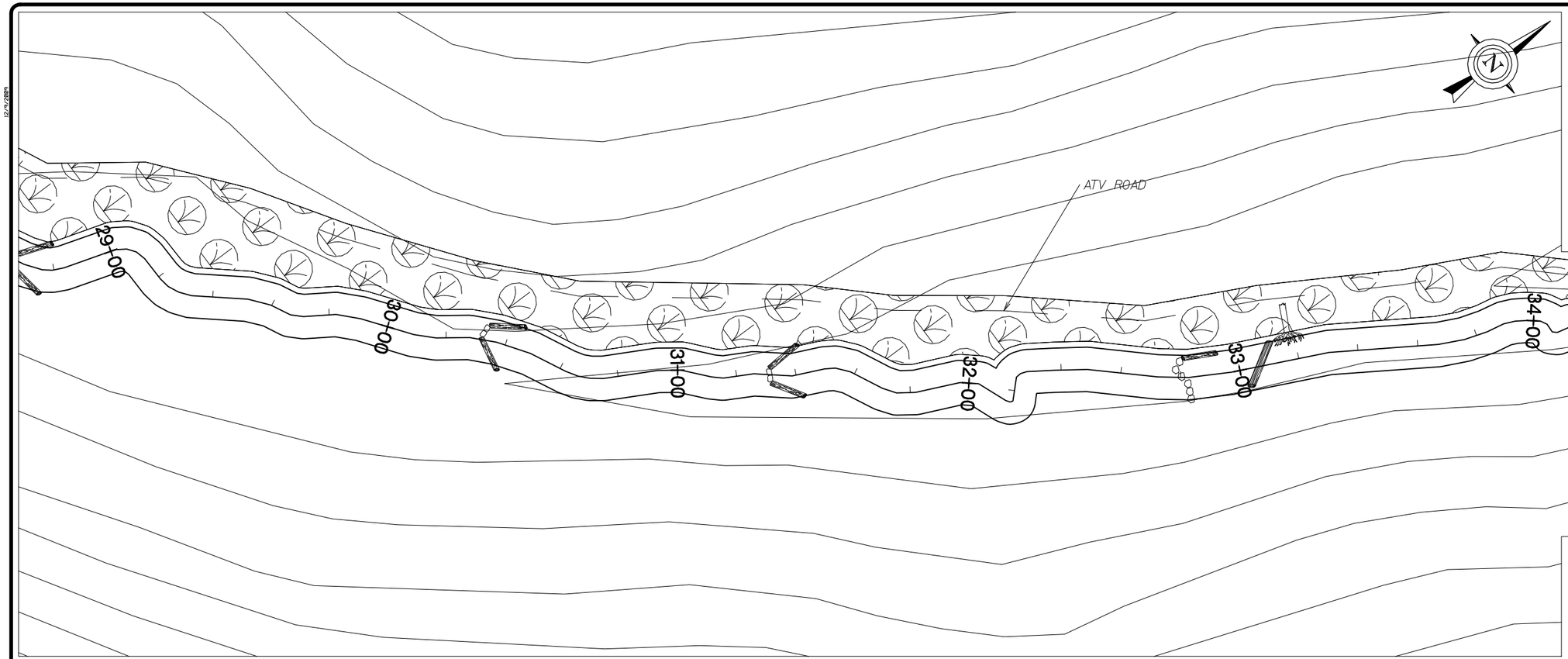
PROPOSED ELEVATIONS

PROFILE TO BE DESIGNED
UPON FINAL CONSTRUCTION

EXISTING ELEVATIONS

12/4/2009

\\Charfs1\Vol6\Projects\Mining\Mine_Projects\Const\Buffalo Mountain\CMP\Plan Views\Const\8088-BM-pln.dgn



PROJECT REFERENCE NO.	SHEET NO.
BUFFALO MTN. SURFACE MINE	8

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

APPROVED BY:

DATE:

Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

PLAN AND PROFILE

10 10 0 20 40
SCALE (FT)

PROPOSED ELEVATIONS

PROFILE TO BE DESIGNED
UPON FINAL CONSTRUCTION

EXISTING ELEVATIONS

12/4/2009

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PROJECT REFERENCE NO.	SHEET NO.
BUFFALO MTN. SURFACE MINE	9

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

APPROVED BY:

DATE:

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

PAVED ROAD

GRAVEL ROAD

ATV ROAD

35+00

36+00

37+00

38+00

39+00

40+00

MATCHLINE SEE SHEET 10

REACH B1

LUT 1 OF THE RIGHT FORK OF HELL CREEK FOR PRESERVATION

PLAN AND PROFILE

10 10 0 20 40
SCALE (FT)

PROPOSED ELEVATIONS

PROFILE TO BE DESIGNED
UPON FINAL CONSTRUCTION

EXISTING ELEVATIONS

12/9/2009

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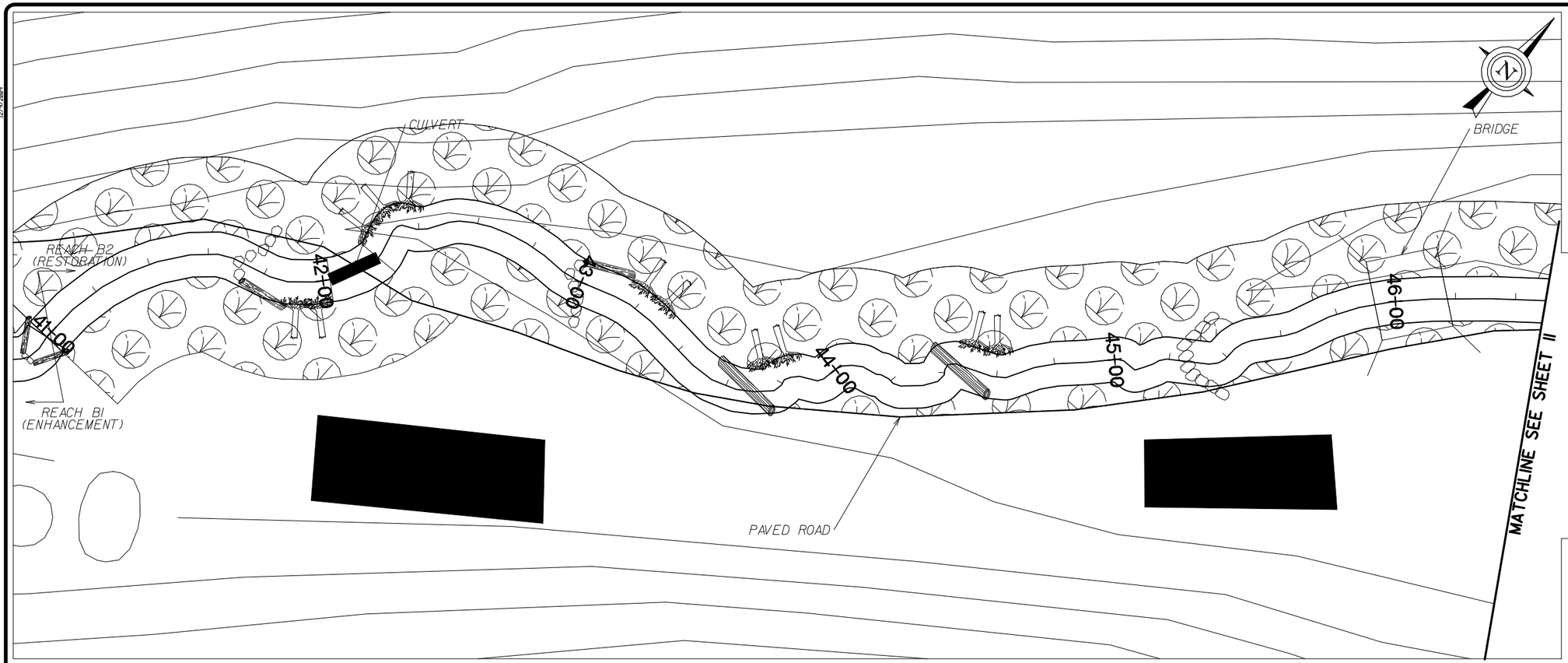

PROJECT REFERENCE NO.	SHEET NO.
BUFFALO MTN. SURFACE MINE	10

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

APPROVED BY:

DATE:

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

REACH B2

PLAN AND PROFILE

10 10 0 20 40
SCALE (FT)

PROPOSED ELEVATIONS

PROFILE TO BE DESIGNED
UPON FINAL CONSTRUCTION

EXISTING ELEVATIONS

12/4/2009

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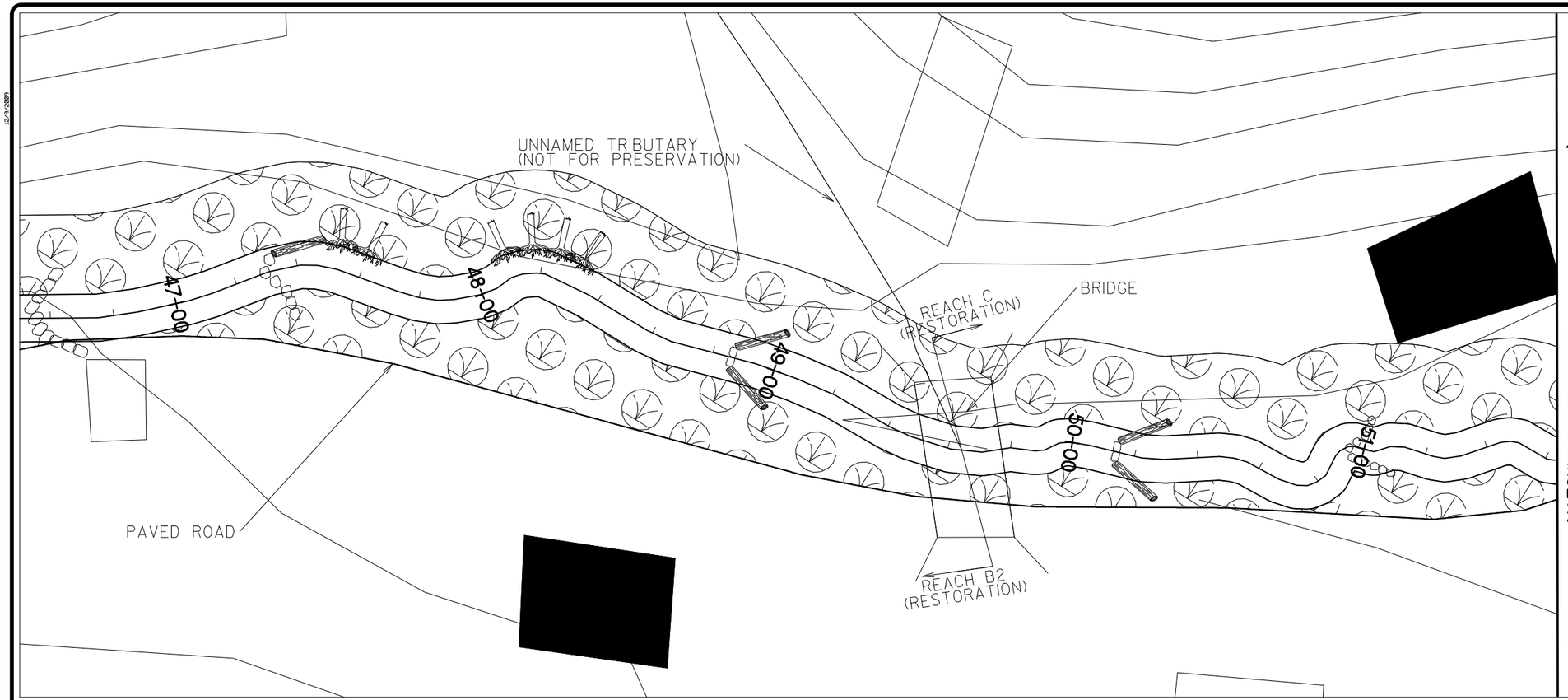

MATCHLINE SEE SHEET 12

PROJECT REFERENCE NO.	SHEET NO.
BUFFALO MTN. SURFACE MINE	11

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

APPROVED BY:

DATE:

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

REACH B2 & C

PLAN AND PROFILE

10 10 0 20 40
SCALE (FT)

PROPOSED ELEVATIONS

PROFILE TO BE DESIGNED
UPON FINAL CONSTRUCTION

EXISTING ELEVATIONS

12/4/2009

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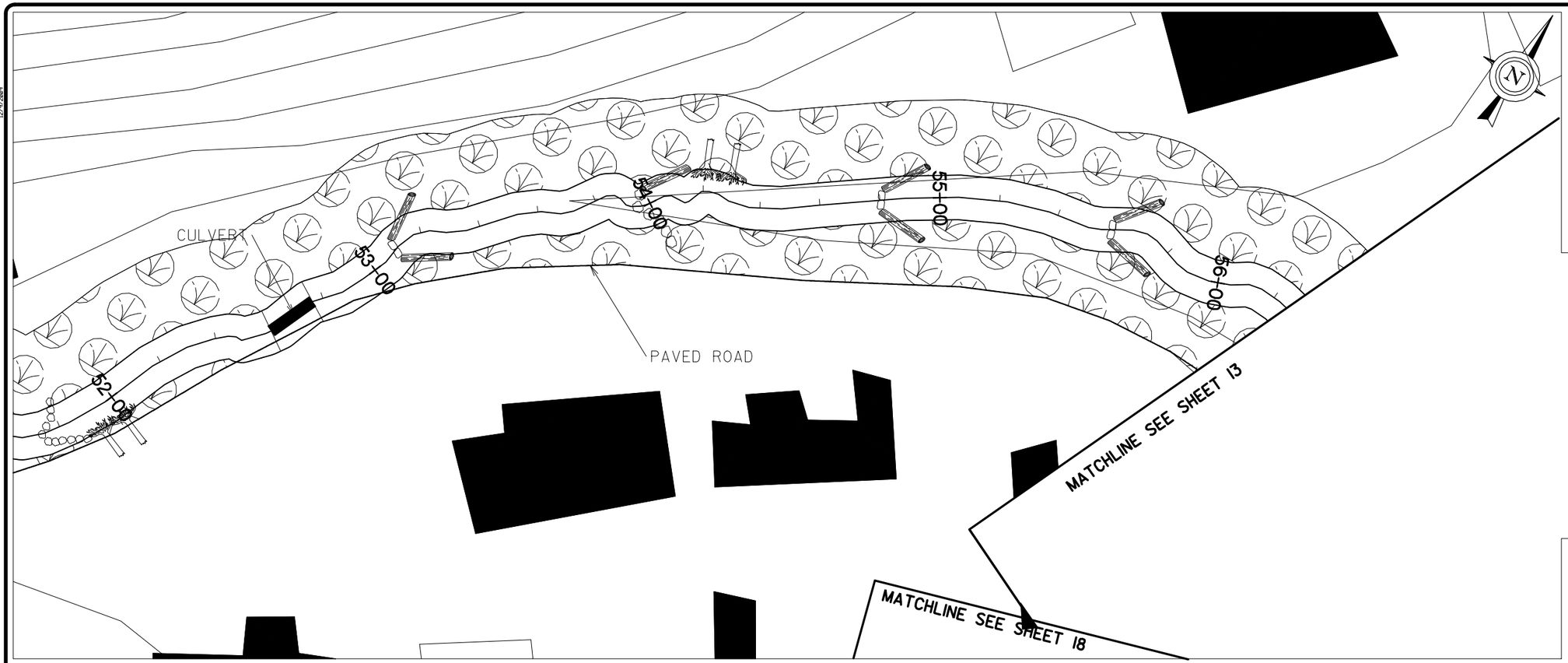


PROJECT REFERENCE NO.	SHEET NO.
BUFFALO MTN. SURFACE MINE	12

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

APPROVED BY:

DATE:

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

REACH C

PLAN AND PROFILE

10 10 0 20 40
SCALE (FT)

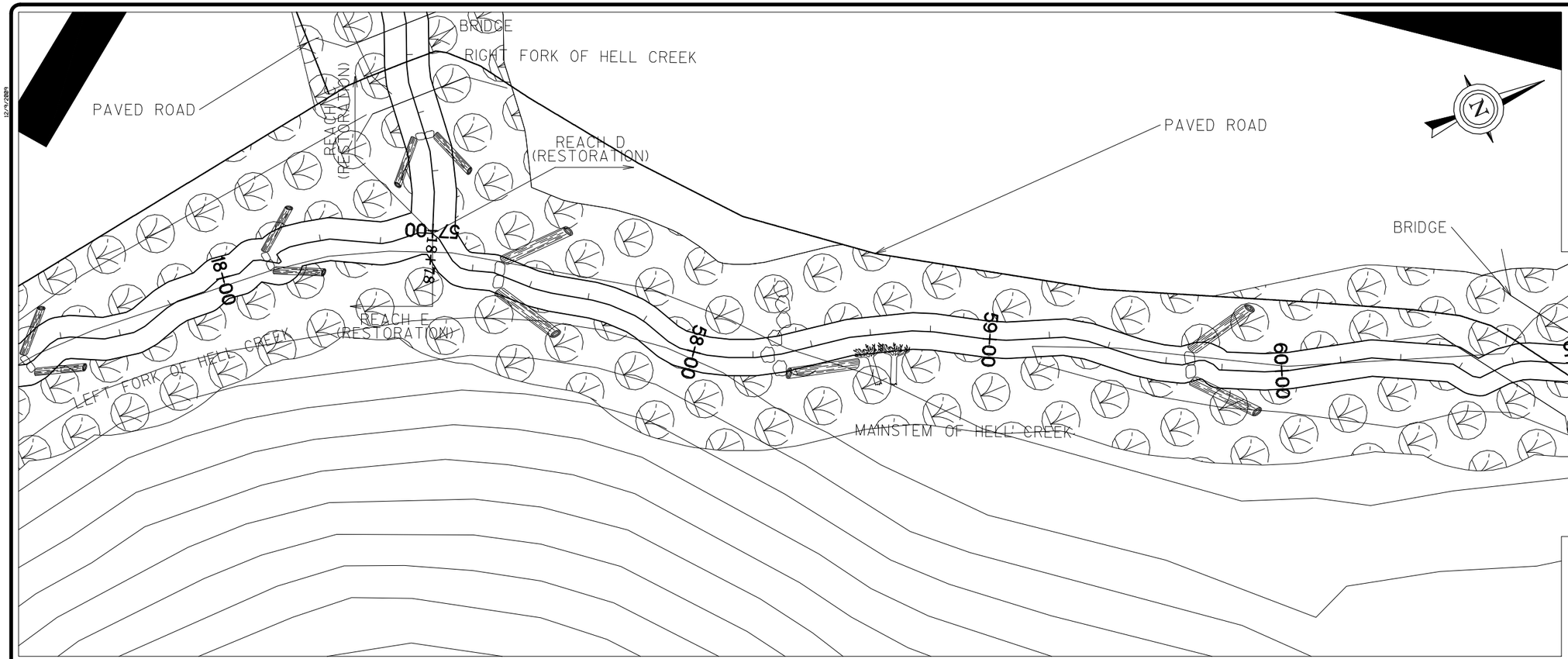
PROPOSED ELEVATIONS

PROFILE TO BE DESIGNED
UPON FINAL CONSTRUCTION

EXISTING ELEVATIONS

12/4/2009

\\Dearfs1\Vol6\Projects\Mining\Mine Projects\Const\Buffalo Mountain\CMP\Plan Views\Const\0803-BM-plln-dgn



PROJECT REFERENCE NO.	SHEET NO.
BUFFALO MTN. SURFACE MINE	13

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

APPROVED BY:

DATE:

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

MATCHLINE SEE SHEET 14

REACH D & E

PLAN AND PROFILE

10 10 0 20 40
SCALE (FT)

PROPOSED ELEVATIONS

PROFILE TO BE DESIGNED
UPON FINAL CONSTRUCTION

EXISTING ELEVATIONS

12/4/2009

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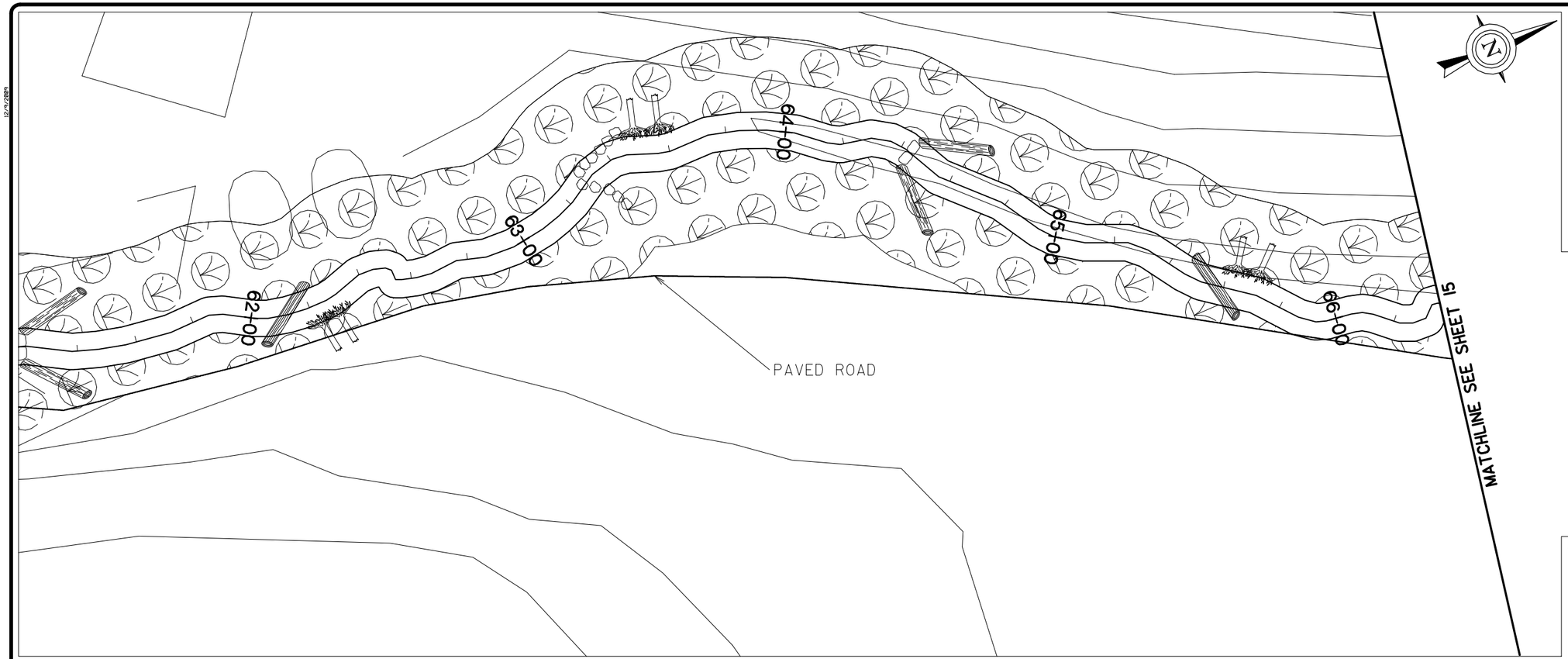

PROJECT REFERENCE NO.	SHEET NO.
BUFFALO MTN. SURFACE MINE	14

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

APPROVED BY:

DATE:

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

REACH D

PLAN AND PROFILE

10 10 0 20 40
SCALE (FT)

PROPOSED ELEVATIONS

PROFILE TO BE DESIGNED
UPON FINAL CONSTRUCTION

EXISTING ELEVATIONS

12/4/2009

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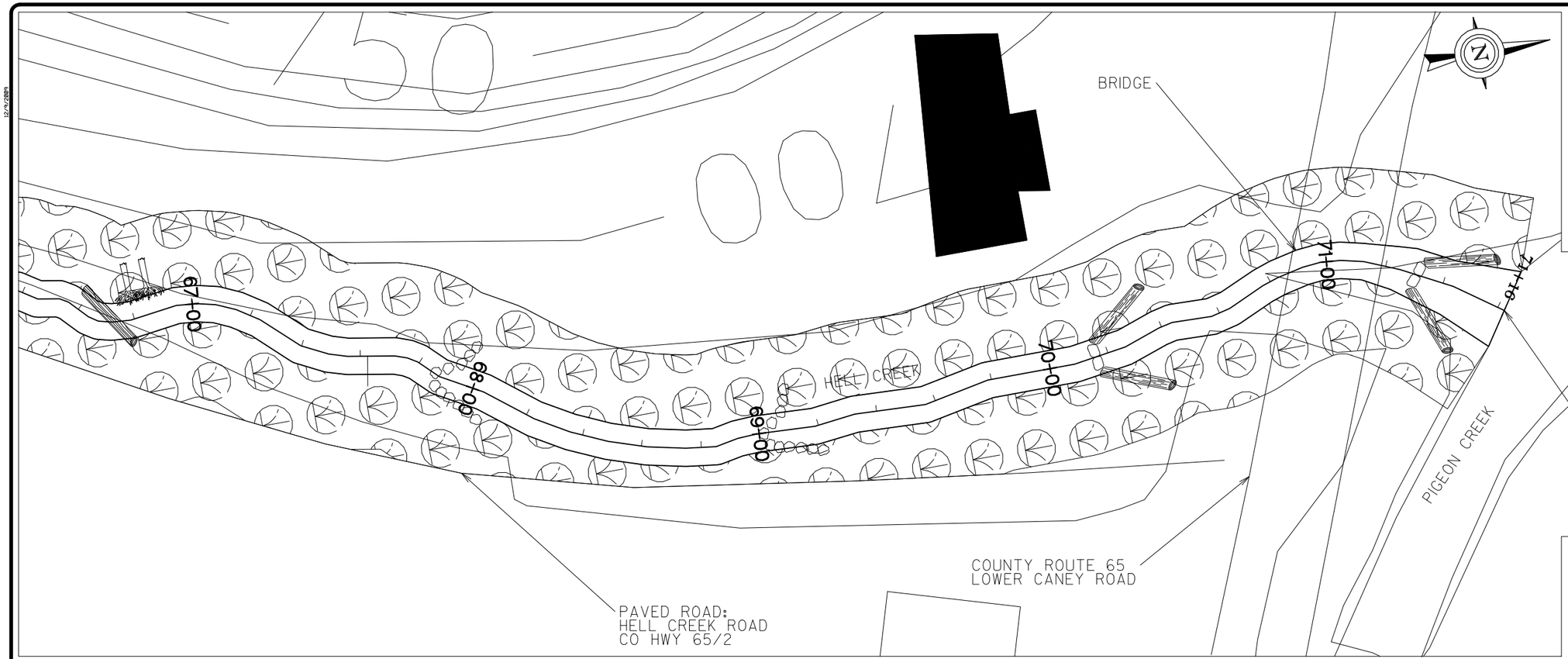

PROJECT REFERENCE NO.	SHEET NO.
BUFFALO MTN. SURFACE MINE	15

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

APPROVED BY:

DATE:

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

REACH D

PLAN AND PROFILE

10 10 0 20 40
SCALE (FT)

PROPOSED ELEVATIONS

PROFILE TO BE DESIGNED UPON FINAL CONSTRUCTION

EXISTING ELEVATIONS

12/4/2009

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PROJECT REFERENCE NO.	SHEET NO.
BUFFALO MTN. SURFACE MINE	16

PRELIMINARY PLANS
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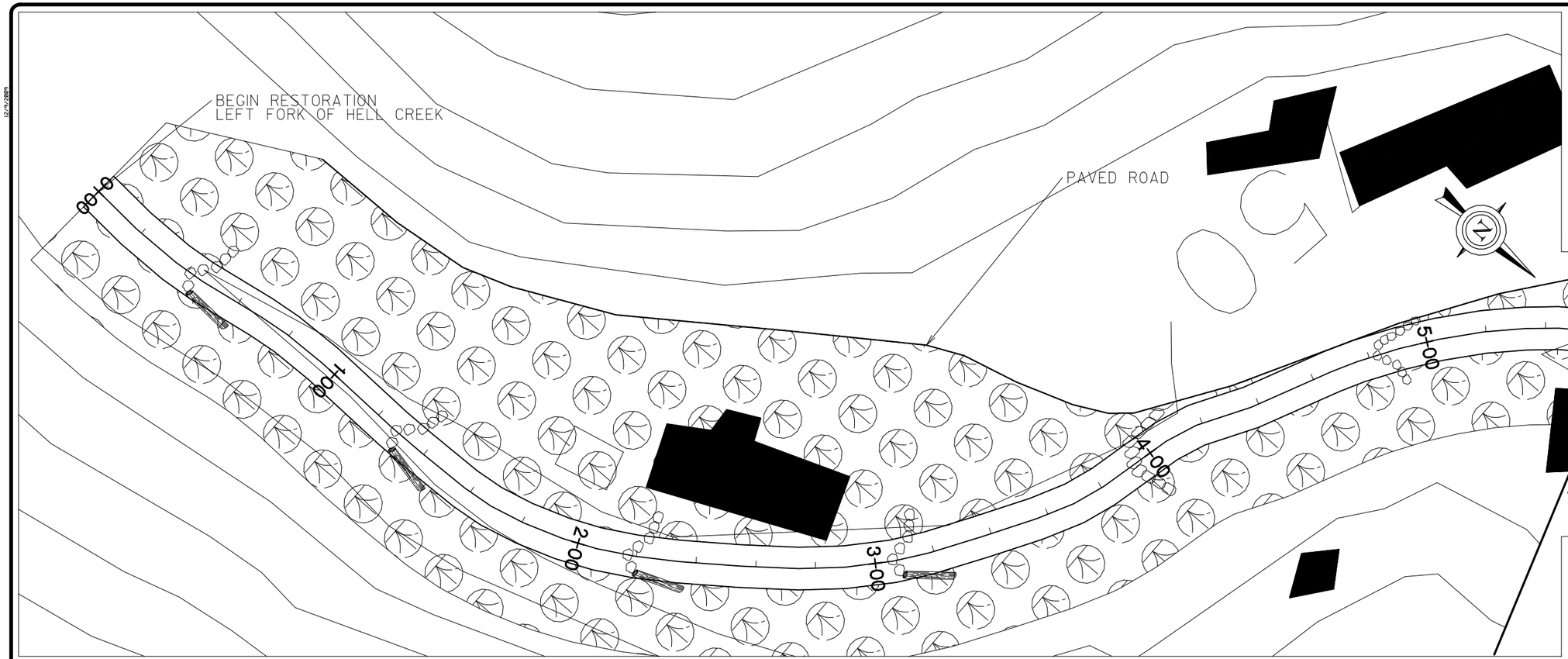
APPROVED BY:

DATE:

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822



REACH E

PLAN AND PROFILE

10 10 0 20 40
SCALE (FT)

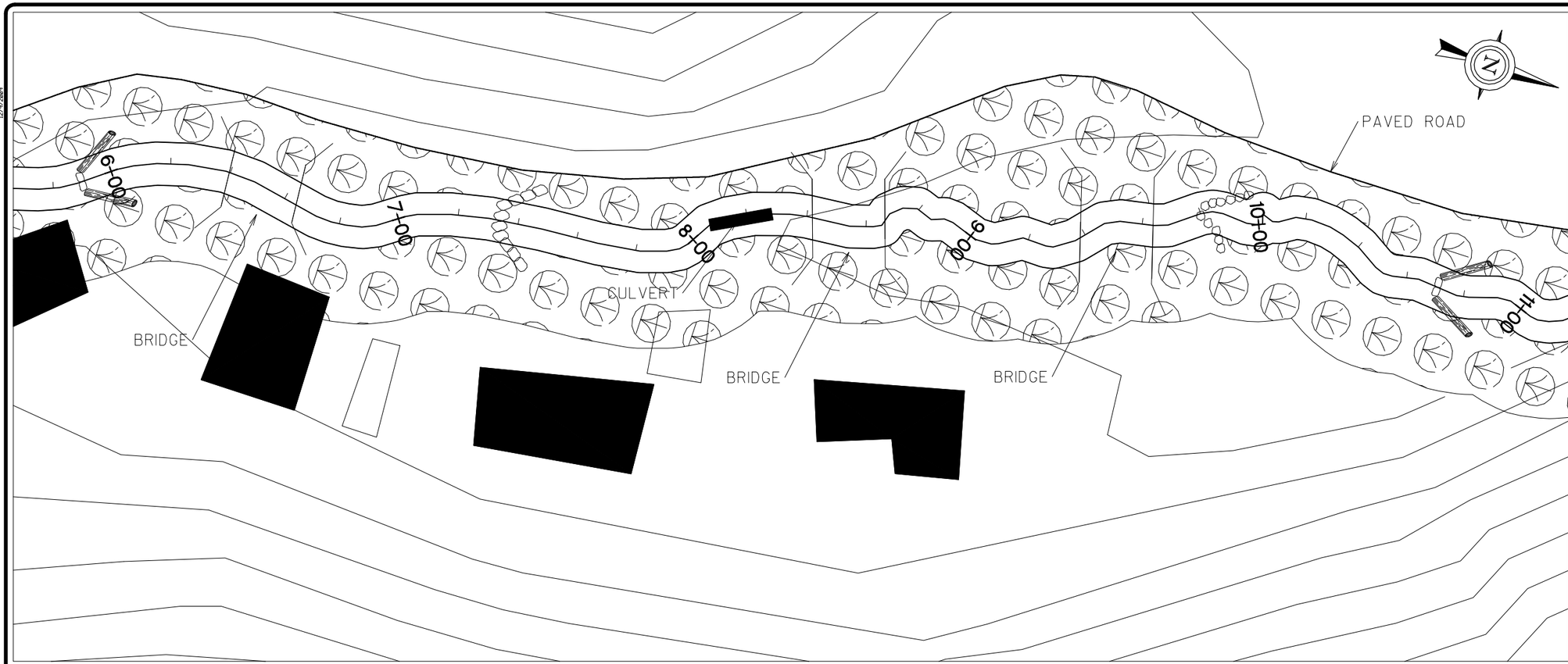
PROPOSED ELEVATIONS

PROFILE TO BE DESIGNED
UPON FINAL CONSTRUCTION

EXISTING ELEVATIONS

12/4/2009

\\Charfs1\Vol6\Projects\Mining\Mine_Projects\Consol\Buffalo_Mountain\CMP\Plan_Views\Const\0817-BM.pln.dgn



PROJECT REFERENCE NO.	SHEET NO.
BUFFALO MTN. SURFACE MINE	17

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

APPROVED BY:

DATE:

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

MATCHLINE SEE SHEET 18

REACH E

PLAN AND PROFILE

10 10 0 20 40
SCALE (FT)

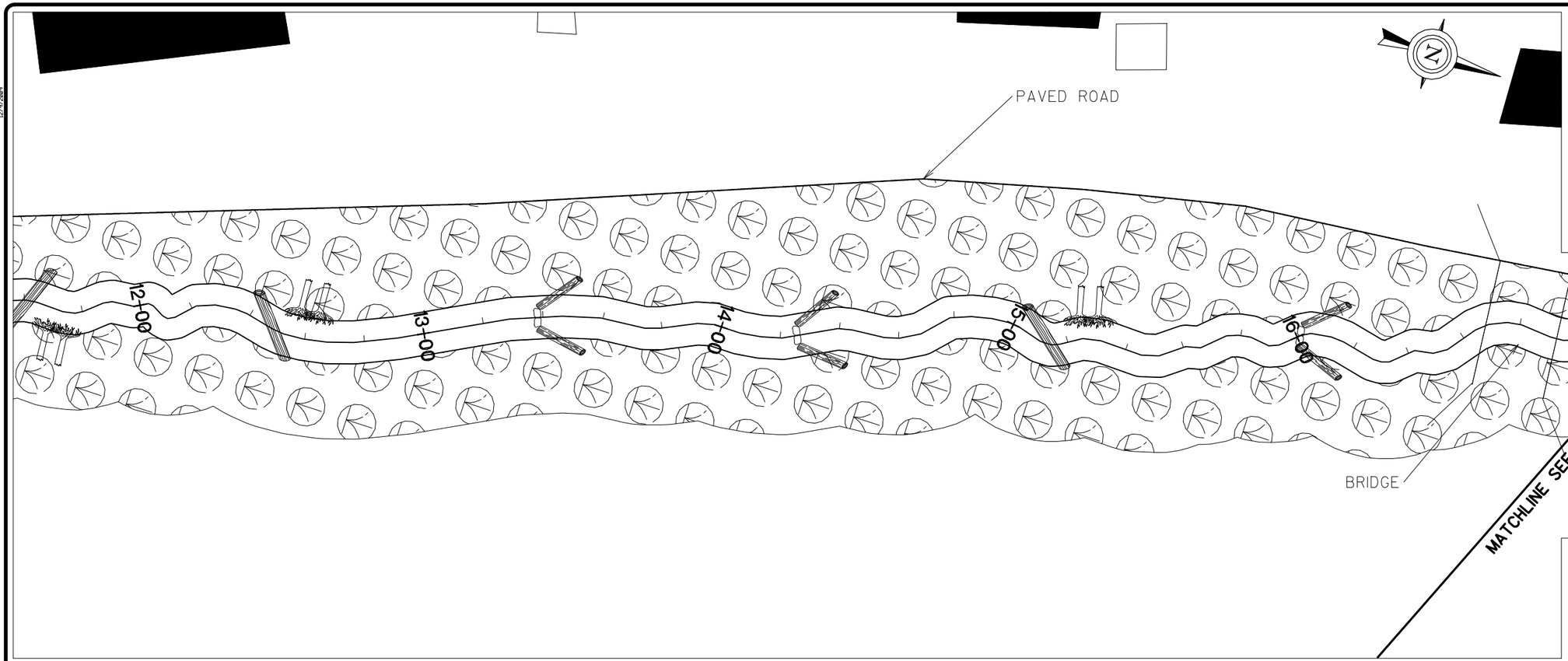
PROPOSED ELEVATIONS

PROFILE TO BE DESIGNED
UPON FINAL CONSTRUCTION

EXISTING ELEVATIONS

12/4/2009

\\Charfs1\Vol6\Projects\Mining\Mine_Projects\Const\Buffalo Mountain\CMP\Plan Views\Const\0808-BM.plo..dgn



PROJECT REFERENCE NO.	SHEET NO.
BUFFALO MTN. SURFACE MINE	18

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

APPROVED BY:

DATE:

Baker
Michael Baker Jr., Inc.
5088 West Washington Street
Charleston, WV 25313
Phone: 304.769.0821
Fax: 304.769.0822

PLAN AND PROFILE

10 10 0 20 40
SCALE (FT)

PROPOSED ELEVATIONS

PROFILE TO BE DESIGNED
UPON FINAL CONSTRUCTION

EXISTING ELEVATIONS

12/4/2009

\\Charfs1\Vol6\Projects\Mining\Mine_Projects\Consol\Buffalo_Mountain\CMP\Plan_Views\Const\0818-Bkt.pln.dgn