Big Cedar Creek Stream Restoration
Final Year 1 Monitoring Report (2009)
Stanly County, North Carolina

EEP Project Number D06054-D

Submitted to/prepared for:

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1.0 EXECUTIVE SUMMARY

This Annual Report details the monitoring activities during the 2009 growing season on the Big Cedar Stream Restoration Site ("Site"). Construction of the Site, including planting of trees, was completed in February 2009. In order to document project success, 23 vegetation monitoring plots, 33 permanent cross-sections, 3,416 linear feet of longitudinal profiles, and 2 crest gauges were installed and assessed across the Site. The 2009 data represents results from the first year of vegetation and hydrologic monitoring.

Prior to restoration, the streams on the Site were channelized and riparian vegetation on the majority of the Site was absent. The riparian vegetation that was present on much of the Site consisted of successional and invasive species such as Chinese privet (*Ligustrum sinense)* and Japanese honeysuckle (*Lonicera japonica*). After construction, it was determined that 11,103 linear feet (LF) of perennial and intermittent channel along Big Cedar Creek (BCC) and six unnamed tributaries (UT1, UT2, UT3, UT1A, UT1B, and UT1C) were restored, 1,171 LF of Big Cedar Creek and UT1 were enhanced, and 539 LF of Big Cedar Creek and the northern most unnamed tributary (UT2) were preserved.

Weather station data from the for NRCS National Climate and Water Center (Albemarle WETS Station in Stanly County – NC 0090) and the USGS Water Data for North Carolina (USGS 352909080103245 Tuckertown Reservoir Dam in Montgomery County, NC) were used to document precipitation amounts. For the 2008 - 2009 growing season, the total recorded rainfall in inches was less than the historical average totals. November was the only month with recorded rainfall data above the historical average.

The 23 monitoring plots are 10 meters by 10 meters in size were used to assess survivability of the woody vegetation planted on Site. They are located to represent the different zones within the project as directed by EEP monitoring guidance. The vegetation monitoring indicated a survivability range of 607 stems per acre to 1092 stems per acre with an overall average of 822 stems per acre. Overall, the Site is on track for meeting the initial vegetation survival criteria of 320 stems per acre surviving after the third growing season and the final success criteria of 260 trees per acre by the end of year five.

In general, dimension, pattern, profile and in-stream structures remained stable during the first growing season. One bankfull event was observed and documented during the month of March.

2.0 PROJECT GOALS, BACKGROUND, & ATTRIBUTES

2.1 Project Location and Description

The Big Cedar Creek Restoration Site ("Site") is located in Stanly County, NC (Figure 1, Appendix A) approximately ten miles south of the City of Albemarle. The Site is part of the Yadkin River Basin within NCDWQ sub-basin 03-07-14 and USGS hydrologic unit 03040105060080.

The Site is part of the Piedmont physiographic province. Medina and others describe the Piedmont as, "… consist(ing) of generally rolling, well-rounded hills and ridges with a few hundred feet of elevation difference between the hills and valleys" (Medina, 2004). The local geology is typical of the Carolina Slate Belt lithotectonic province of central North Carolina, and is comprised of Proterozoic and Cambrian age siltstone, mudstone, and mafic hypabyssal intrusive rocks according to the 1 degree by 2 degree geologic map of the Charlotte Quadrangle prepared by the USGS (Goldsmith et al., 1988). Soil types at the site were researched using Natural Resources Conservation Service (NRCS) soil survey data for Stanly County, along with on-site evaluations. The predominant soil series within the floodplain area of the site is mapped as Oakboro silt loam series, a hydric soil.

The Big Cedar Creek Restoration Site drains predominately forested and agricultural lands, as well as a portion of the residential and commercial district of the town of Norwood. The Winston-Salem Southbound Railroad line parallels Big Cedar to the east, then turns to cross Big Cedar and UT1 upstream of their confluence.

To visit the Site, take Highway 52 for approximately ten miles south, turn right onto Mount Zion Church Road (1.25 miles south of the Town of Norwood). Follow Mount Zion Church Road for approximately 0.5 mile west to the intersection of Mount Zion Road and Big Cedar Creek. UT1, UT2, and the upstream reaches of Big Cedar Creek can be accessed from the farm road on the north side of Mount Zion Church Road, approximately 0.25 miles east of the intersection of the railroad and Mount Zion Church road. Reach 5 and 6 of Big Cedar Creek can be accessed from a farm field approximately 0.1 mile west of the intersection of the railroad and Mount Zion Church road.

2.2 Restoration Summary

2.2.1 Mitigation Goals and Objectives

The specific goals for the Big Cedar Creek Site Restoration Project were as follows:

- Create geomorphically stable conditions on the Big Cedar Creek project site.
- Improve and restore hydrologic connections between the streams and their floodplains.
- Improve the water quality in the Big Cedar Creek and Rocky River watersheds.
- Improve aquatic and terrestrial habitat along the project corridor.

The primary objective of the Big Cedar Creek Restoration project was to accelerate the channel evolutionary processes by constructing channels with geomorphically stable cross sections, increased sinuosity, and access to the floodplain at bankfull stage. Flood attenuation, increased groundwater infiltration, and alleviation of bank stress resulted from providing floodplain access. Water quality improvements were made through fencing cattle out of the restored reaches and by reducing bank erosion throughout the project site. Aquatic habitat was improved by providing geomorphically stable habitat features and through placement of in-stream habitat structures. Invasive vegetative species removal efforts and reforestation of the riparian buffer with native species complemented the restoration of Big Cedar Creek, UT1, UT2, UT3, UT1A, UT1B, and UT1C. Existing native trees were preserved onsite wherever feasible. The vegetative efforts will benefit both aquatic and terrestrial habitat as the site matures.

2.2.2 Project Description and Restoration Approach

The project involved the restoration, enhancement, and preservation of Big Cedar Creek and six unnamed tributaries to Big Cedar Creek. A total of 11,103 linear feet (LF) of stream channel along Big Cedar Creek and six unnamed tributaries (UT1, UT2, UT3, UT1A, UT1B, and UT1C) were restored. Additionally 1,171 LF of Enhancement II along Big Cedar Creek and UT1 and 539 LF of preservation along Big Cedar Creek and UT2 based on the post-construction as-built survey. The Site has a history of general agricultural usage including cattle, cotton, and corn production. Prior to restoration, the streams on the project site were channelized and riparian vegetation on the majority of the Site had been removed. The riparian vegetation that was present on much of the Site consisted of successional and invasive species such as Chinese privet (*Ligustrum sinense)* and Japanese honeysuckle (*Lonicera japonica*). As a result of channelization, many of the project reaches were incised and lacked bankfull floodplain access.

For analysis and design purposes, Big Cedar Creek, UT1, and UT2 were divided into 11 reaches (As-built Plan Sheets, Appendix D). Big Cedar Creek flows from north to south entering the Site at the northern property line. The reaches on Big Cedar Creek were numbered sequentially from north to south. Big Cedar Creek Reach 1 starts at the northern property line and ends at the confluence with UT2. Big Cedar Creek Reaches 2 through 4 are located between this confluence and the Winston-Salem Southbound Railroad line crossing. Big Cedar Creek Reach 5 begins below the railroad crossing and continues to just upstream of Big Cedar's confluence with UT1. Reach 6 begins where Reach 5 ends and continues to the culvert at Mount Zion Church Road. UT1 flows from west to east entering the Site at the western most property line. The reaches on UT1 (1 through 4) were numbered sequentially from west to east. UT1 ends at its confluence with Big Cedar Creek. UT1 A, B, and C are tributaries to UT1 that flow north to south entering the Site along the northern side of conservation easement along UT1. UT1A, B, and C converge with UT1 in Reaches 4, 3, and 1 respectively. UT2 flows northwest to southeast entering the Site along the northern property line. UT2 ends at its confluence with Big Cedar Creek. UT3 flows east to west under the Winston-Salem Southbound Railroad line. UT3 enters the Site on the eastern side of the conservation easement along Big Cedar Creek and ends at its confluence with Big Cedar Creek Reach 3.

A holistic restoration approach was based on the condition of the overall Site and each reach's potential for restoration as determined during the site assessment. Design criteria for the proposed stream concept were selected based on the range of the reference data and the desired performance of the proposed channel. The developed design criteria were then compared to past projects built with similar conditions. Ultimately, these sites provide the best pattern and dimension 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 stream bank conditions. If past ratios did

not provide adequate stability or bedform diversity, they were not used. Conversely, if past project ratios created stable channels with optimal bedform diversity, they were incorporated into the design.

Following the initial application of design criteria, detailed refinements were made to accommodate the existing valley morphology and to promote natural channel adjustment following construction. For example, old meander scars in the Big Cedar Creek floodplain were incorporated for a more historical replication of channel alignment. The design philosophy employed at the Big Cedar Creek site was to use conservative design parameter values based on reference reach data and lessons learned from past projects. This allows the project to evolve in a positive direction as the permanent vegetation becomes established.

The overall restoration approach for the Site allows stream flows larger than bankfull flows to spread onto the floodplain, dissipating flow energies and reducing stress on streambanks. In-stream structures were used throughout all reaches to control streambed grade, reduce streambank stress, and promote bedform sequences and habitat diversity. The in-stream structures consisted of root wads, log vanes, log weirs, cross vanes, j-hooks, and constructed riffles. The wide variety of structures was used to promote a diversity of habitat features in the restored channel. Where grade control was a consideration, constructed riffles and grade control j-hooks were installed to provide long-term stability. Streambanks were stabilized using a combination of erosion control matting, temporary and permanent seeding, bare-root planting, and brush mattresses. The Site was planted with native vegetation and is protected through a permanent conservation easement. Table 1 provides a summary of the project approach depicted in Figure 2 in Appendix A.

Table 1. Project Mitigation Approach

Big Cedar Creek Restoration Site: EEP Contract No. D06054-D

Project Segment or Reach ID	Existing Footage (LF)	Mitigation Type *	Approach**	Linear Footage (LF)	Mitigation Ratio	Mitigation Units	Stationing	Comment
Big Cedar Creek - Reach 1	350	R	P2	603	1:1	603	10+00 to 16+03	Installed in-stream structures to control grade and reduce bank erosion. Priority 2 Restoration was used for this transitional reach to bring the channel up to the historic floodplain as quickly as possible.
Big Cedar Creek - Reach 2	1,016	R	P1	2,239	1:1	2,239	16+03 to 38+92	Installed in-stream structures to control grade and reduce bank erosion.
Big Cedar Creek - Reach 3	2,046	R	P1	1,827	1:1	1,827	38+92 to 57+19	Installed in-stream structures to control grade and reduce bank erosion.
Big Cedar Creek - Reach 4	976	R	P2	410	1:1	410	57+19 to 61+29	Installed in-stream structures to control grade and reduce bank erosion. Priority 2 was employed to tie the channel into the box culvert at the railroad crossing.

Table 1. Project Mitigation Approach								
Big Cedar Creek Restoration Site: EEP Contract No. D06054-D								
Project Segment or Reach ID	**Existing Footage (LF)**	**Mitigation Type ***	**Approach****	**Linear Footage (LF)**	**Mitigation Ratio**	**Mitigation Units**	**Stationing**	**Comment**
Big Cedar Creek - Reach 5	534	P	P	378	1:5	76	63+79 to 67+57	Preservation.
Big Cedar Creek - Reach 6	904	E	EII	1,046	1:2.5	418	67+57 to 78+03	Regraded banks, installed one grade control cross-vane and one log vane.
Unnamed Tributary 1 - Reach 1	1,998	R	P1, P2	1,248	1:1	1,248	10+46 to 22+94	Installed in-stream structures to control grade and reduce bank erosion. Priority 2 Restoration was used in the upstream, transitional section of the reach to bring the channel quickly up to the historic floodplain.
Unnamed Tributary 1 - Reach 2	759	R	P1	1,016	1:1	1,016	22+94 to 33+36	Installed in-stream structures to control grade and reduce bank erosion. The valley narrows and slopes increase to accommodate the decrease in floodplain area.
Unnamed Tributary 1 - Reach 3	1,518	R	P1	1,885	1:1	1,885	33+36 to 53+04	Installed in-stream structures to control grade and reduce bank erosion.
Unnamed Tributary 1 - Reach 4	935	R	P1	996	1:1	996	53+04 to 63+52	Installed in-stream structures to control grade and reduce bank erosion.
	125	E	EII	125	1:2.5	50	66+31 to 67+56	Regraded banks and existing riffle.
Unnamed Tributary 2	625	R	P1, P2	609	1:1	609	10+00 to 16+09	Installed in-stream structures to control grade and reduce bank erosion
	162	P	P	161	1:5	32	N/A	Preservation
Unnamed Tributary 3 to Big Cedar Creek	73	R	P1	73	1:1	73	11+08 to 11+82	Installed in-stream structures to control grade. Regraded banks, stabilized with matting, installed stable cattle crossing outside easement to protect reach.
Unnamed Tributary 1A	85	R	P1	85	1:1	85	10+41 to 11+26	Constructed new pattern to connect tributary to UT1. Installed coir matting and planted.
Unnamed Tributary 1B	33	R	P1	34	1:1	34	10+00 to 10+34	Constructed new pattern to connect tributary to UT1. Installed coir matting and planted.

Table 1. Project Mitigation Approach								
Big Cedar Creek Restoration Site: EEP Contract No. D06054-D								
Project Segment or Reach ID	**Existing Footage (LF)**	**Mitigation Type ***	**Approach****	**Linear Footage (LF)**	**Mitigation Ratio**	**Mitigation Units**	**Stationing**	**Comment**
Unnamed Tributary 1C	78	R	P1	78	1:1	78	10+54 to 11+32	Constructed new pattern to connect tributary to UT1. Installed coir matting and planted.
Total linear ft of channel restored or preserved:				12,813				
Mitigation Unit Summation for Streams:				11,679				

* R = Restoration
E = Enhancement
P = Preservation

** P1 = Priority I
P2 = Priority II
P = Preservation
EII = Enhancement II

2.2.3 Project History, Contacts, and Attribute Data

Big Cedar Creek was restored by Baker through a full delivery contract with NCEEP. The chronology of the Big Cedar Creek Restoration Project is presented in Table 2. The contact information for all designers, contractors, and relevant suppliers is presented in Table 3. Relevant project background information is presented in Table 4.

Table 2. Project Activity and Reporting History

Big Cedar Creek Restoration Site: Project No. D06054-D			
Activity or Report	**Scheduled Completion**	**Data Collection Complete**	**Actual Completion or Delivery**
Restoration Plan Prepared	N/A	N/A	Jul-07
Restoration Plan Amended	N/A	N/A	Jul-07
Restoration Plan Approved	Mar-07	N/A	Jul-07
Final Design – (at least 90% complete)	N/A	N/A	Jun-07
Construction Begins	Oct-07	N/A	Nov-07
Temporary S&E mix applied to entire project area	NA	N/A	Dec-08
Permanent seed mix applied to entire project area	Dec-07	N/A	Dec-08
Planting of live stakes	Dec-07	N/A	Feb-09
Planting of bare root trees	Dec-07	N/A	Feb-09
End of Construction	Dec-07	N/A	Feb-09
Survey of As-built conditions (Year 0 Monitoring-baseline)	May-09	Feb-09	May-09
Year 1 Monitoring	Dec-09	Nov-09	Apr-10 (final)
Year 2 Monitoring	Scheduled Dec-10	Scheduled Nov-10	N/A
Year 3 Monitoring	Scheduled Dec-11	Scheduled Nov-11	N/A
Year 4 Monitoring	Scheduled Dec-12	Scheduled Nov-12	N/A
Year 5 Monitoring	Scheduled Dec-13	Scheduled Nov-13	N/A

Table 3. Project Contact Table

Big Cedar Creek Restoration Site: Project No. D06054-D	
Designer	
Michael Baker Engineering, Inc.	1447 South Tryon Street, Suite 200 Charlotte, NC 28203 Contact: Christine Miller, Tel. 704-319-7898
Construction Contractor	
River Works, Inc.	8000 Regency Parkway, Suite 200 Cary, NC 27518 Contact: Will Pedersen, Tel. 919-459-9001
Planting Contractor	
River Works, Inc.	8000 Regency Parkway, Suite 200 Cary, NC 27518 Contact: Will Pedersen, Tel. 919-459-9001
Seeding Contractor	
River Works, Inc.	8000 Regency Parkway, Suite 200 Cary, NC 27518 Contact: Will Pedersen, Tel. 919-459-9001
Seed Mix Sources	Mellow Marsh Farm, 919-742-1200
Nursery Stock Suppliers	International Paper, 1-888-888-7159
Monitoring Performers	
Michael Baker Engineering, Inc.	1447 South Tryon Street, Suite 200 Charlotte, NC 28203 Contact:
Stream Monitoring Point of Contact:	Ian Eckardt, Tel. 704-319-7890
Vegetation Monitoring Point of Contact:	Ian Eckardt, Tel. 704-319-7890

Table 4. Project Background Table

Big Cedar Creek Restoration Site: Project No. D06054-D	
Project County:	Stanly County, NC
Drainage Area:	
BCC Reach 1	2.85 mi^2
BCC Reach 2	2.91 mi^2
BCC Reach 3	3.30 mi^2
BCC Reach 4	3.35 mi^2
BCC Reach 5	4.67 mi^2
BCC Reach 6	4.71 mi2
UT1 Reach 1	0.93 mi2
UT1 Reach 2	0.98 mi2
UT1 Reach 3	1.18 mi2
UT1 Reach 4	1.21 mi2
UT1A	0.02 mi2

Table 4. Project Background Table

Big Cedar Creek Restoration Site: Project No. D06054-D	
UT1B	0.12 mi2
UT1C	0.10 mi2
UT2	0.55 mi2
UT3	0.15 mi2
Estimated Drainage % Impervious Cover:	
BCC Reach 1	<1%
BCC Reach 2	<1%
BCC Reach 3	<1%
BCC Reach 4	<1%
BCC Reach 5	<1%
BCC Reach 6	<1%
UT1 Reach 1	<1%
UT1 Reach 2	<1%
UT1 Reach 3	<1%
UT1 Reach 4	<1%
UT1A	0%
UT1B	0%
UT1C	0%
UT2	0%
UT3	0%
Stream Order:	
BCC Reach 1	3rd
BCC Reach 2	3rd
BCC Reach 3	3rd
BCC Reach 4	3rd
BCC Reach 5	3rd
BCC Reach 6	3rd
UT1 Reach 1	2nd
UT1 Reach 2	2nd
UT1 Reach 3	2nd
UT1 Reach 4	2nd
UT1A	1st
UT1B	1st
UT1C	1st
UT2	1st
UT3	1st
Physiographic Region:	Piedmont
Ecoregion:	Carolina Slate Belt

Table 4. Project Background Table

Big Cedar Creek Restoration Site: Project No. D06054-D	
Rosgen Classification of As-Built:	
BCC Reach 1	E/C
BCC Reach 2	E/C
BCC Reach 3	E/C
BCC Reach 4	E/C
BCC Reach 5	B3/1c
BCC Reach 6	F→C
UT1 Reach 1	E/C
UT1 Reach 2	E/C
UT1 Reach 3	E/C
UT1 Reach 4	C
UT1A	E/C
UT1B	E/C
UT1C	E/C
UT2	E
UT3	E/C
Cowardin Classification	Riverine, Upper Perennial, Unconsolidated Bottom, Cobble-Gravel
Dominant Soil Types	
BCC Reach 1	Oa
BCC Reach 2	Oa
BCC Reach 3	Oa
BCC Reach 4	Oa
BCC Reach 5	Co
BCC Reach 6	Co, BaF
UT1 Reach 1	Oa
UT1 Reach 2	Oa, GoF
UT1 Reach 3	Oa, GoF
UT1 Reach 4	Oa, Co
UT1A	Oa
UT1B	Oa
UT1C	Oa
UT2	Oa
UT3	Oa
Reference site IDs	Unnamed Tributary to Rocky Creek, Richland Creek, Morgan Creek and Spencer Creek
USGS HUC for Project and Reference sites	03010103170030 (Project); 03040101080010 (Reference)
NCDWQ Sub-basin for Project and Reference	03-02-01 (Project); 03-07-02 (Reference)
NCDWQ classification for Project and Reference	C
Any portion of any project segment 303d listed?	No
Any portion of any project segment upstream of a 303d listed segment?	No
Reasons for 303d listing or stressor?	N/A
% of project easement fenced	50%

3.0 MONITORING PLAN

Channel stability, vegetation survival, and macroinvertebrate communities will be monitored on the project site. Post-restoration monitoring will be conducted for five years following the completion of construction to document project success.

3.1 Stream Monitoring

Geomorphic monitoring of restored stream reaches will be conducted for five years to evaluate the effectiveness of the restoration practices. Monitored stream parameters include bankfull flows, stream dimension (cross-sections), pattern and profile (longitudinal profile survey), and photographic documentation. The methods used and any related success criteria are described below for each parameter. For monitoring stream success criteria, 33 permanent cross-sections, 2 crest gauges, and 104 photo identification points were established. The specific locations of these monitoring features are represented on the as-built plan sheets in Appendix D.

3.1.1 Bankfull Events

The occurrence of bankfull events within the monitoring period will be documented by the use of crest gauges and photographs on each project reach. Two crest gauges were installed on the floodplain within 10 feet of the restored channel. The crest gauges will record the highest watermark between site visits, and the gauge will be checked at each site visit to determine if a bankfull event has occurred. Photographs will be used to document the occurrence of debris lines and sediment deposition on the floodplain during monitoring site visits.

Two bankfull flow events must be documented at the crest gauge within the 5-year monitoring period. The two bankfull events must occur in separate years; otherwise, the stream monitoring will continue until two bankfull events have been documented in separate years.

3.1.2 Cross-sections

The 33 permanent cross-sections were installed throughout the entire Site. Within each project reach the distance interval between cross-sections was approximately equal to the combined length of 20 bankfull widths. An emphasis has been placed on riffle data collection because many of the project design parameters are based on riffle dimensions. This is reflected in a higher ratio of riffle to pool cross sections selected for monitoring. Each cross-section was marked on both banks with permanent pins to establish the exact transect used. A common benchmark will be used for cross-sections and consistently referenced to facilitate comparison of year-to-year data. The annual cross-sectional survey will include points measured at all breaks in slope, including top of bank, bankfull, inner berm, water surface, and thalweg, if the features are present.

There should be little change in as-built cross-sections. If changes do take place, they will be evaluated to determine if they represent a movement toward a more unstable condition (e.g., down-cutting or erosion) or a movement toward increased stability (e.g., settling, vegetative changes, deposition along the banks, or decrease in width/depth ratio). Riffle cross-sections will be classified using the Rosgen Stream Classification System, and all monitored cross-sections should fall within the quantitative parameters defined for channels of the design stream type.

3.1.3 Pattern

Annual measurements taken for the plan view of the Site will include sinuosity and meander width ratio. Radius of curvature measurements will be taken on newly constructed meanders for the first year of monitoring only. Pattern measurements should show little adjustment over the five year

monitoring period. If adjustments do occur, they will be evaluated to ensure that the new measurements fall within the quantitative parameters defined for channels of the design stream type.

3.1.4 Longitudinal Profile

A longitudinal profile will be completed annually during each year of the monitoring period. The profile will be conducted for at least 3,331 LF of restored stream reaches where pattern has been adjusted. The exact location of the annual longitudinal profile is marked on the As-built plan sheets in Appendix D. Measurements will include thalweg, water surface, inner berm, bankfull, and top of low bank. Each of these measurements will be taken at the head of each feature (e.g., riffle, run, pool, glide) and at the maximum pool depth. The survey will be tied to a permanent benchmark.

The longitudinal profiles should show that the bedform features are remaining stable (i.e., they are not aggrading or degrading). The pools should remain deep, with flat water surface slopes, and the riffles should remain steeper and shallower than the pools. Bedforms observed should be consistent with those observed for channels of the design stream type.

3.1.5 Bed Material Analysis

One substrate sample was taken at a constructed riffle on UT1 to show a general particle distribution at the baseline condition. These data are provided in Appendix B. Six post-restoration pebble counts will be performed on Big Cedar, six on UT1, and two on UT2. Pebble counts will be conducted during post-restoration monitoring years 1, 3, and 5 at the time the cross sectional data is collected. This data will be compared to known distributions from the existing conditions surveys. Results should indicate either maintenance of seeded bed material or a progression towards previous distributions.

3.1.6 Watershed Observations

As part of the post-construction monitoring following construction, any observed activities or changes in the watershed will be noted and connections to onsite observations will be drawn, where appropriate.

3.1.7 Photo Reference Sites

Photographs will be used to document restoration success visually. Reference stations will be photographed after construction and for five years following construction. Reference photos will be taken once a year, from a height of approximately five to six feet. Permanent markers will be established to ensure that the same locations (and view directions) on the Site are monitored during each monitoring period. Photographs taken at cross sections are provided in Appendix B, while structure photographs are shown in Appendix E.

3.1.7.1 Lateral Reference Photos

Reference photo transects will be taken at each permanent cross-section. Photographs will be taken of both banks at each cross-section. The survey tape will be centered in the photographs of the bank. The water line will be located in the lower edge of the frame, and as much of the bank as possible will be included in each photo. Photographers will make an effort to consistently document the same view in each photo point over time.

3.1.7.2 Structure Photos

Photographs will be taken at grade control structures along the restored streams. Photographers will make every effort to consistently document the same area in each photo point over time. Photographs will be used to evaluate channel aggradation or degradation, bank erosion, success of riparian vegetation, and effectiveness of erosion control measures subjectively. Lateral photos

should not indicate excessive erosion or continuing degradation of the banks. A series of photos over time should indicate successive maturation of riparian vegetation. The position of each structure photo point is located on the as-built plan sheets in Appendix D.

3.2 Vegetation Monitoring

Successful restoration of the vegetation on a mitigation site is dependent upon hydrologic restoration, active planting of preferred canopy species, and volunteer regeneration of the native plant community. In order to determine if the criteria are achieved, twenty-three vegetation monitoring quadrants were installed across the Site as directed by EEP monitoring guidance. The number of quadrants required is based on the plot number spreadsheet (07312006-2) provided by NCEEP that captures approximately five percent of the total conservation easement. The sizes of individual quadrants are 100 square meters for woody tree species. Vegetation monitoring will occur in the fall, prior to the loss of leaves. Individual quadrant data will be provided and will include species composition, density, and survivability. Individual seedlings will be marked to ensure that they can be found in subsequent monitoring years. Mortality will be determined from the difference between the previous year's living, planted seedlings and the current year's living, planted seedlings.

At the end of the first growing season, species composition, density, and survival will be evaluated. For each subsequent year, until the final success criteria are met, the Site will be evaluated between June and November.

The interim measure of vegetative success for the Site will be the survival of at least 320, three-year-old, planted trees per acre at the end of Year 3 of the monitoring period. The final vegetative success criterion will be the survival of 260, five-year old, planted trees per acre at the end of Year 5 of the monitoring period. While measuring species density is the current accepted methodology for evaluating vegetation success on restoration projects, species density alone may be inadequate for assessing plant community health. For this reason, the vegetation monitoring plan will incorporate the evaluation of additional plant community indices to assess overall vegetative success.

Herbaceous vegetation, primarily native grasses, were planted at the site shall have at least 80 percent coverage of the seeded/planted area. Any herbaceous vegetation not meeting these criteria shall be replanted. At a minimum, at all times ground cover at the project site shall be in compliance with the North Carolina Erosion and Sedimentation Control Ordinance.

3.3 Biological Monitoring

Benthic macroinvertebrates can be used to assess quantity and quality of life in the creek. In particular, specimens belonging to the insect orders Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies) are useful as an index of water quality. These groups are generally the least tolerant to water pollution and therefore are very useful indicators of water quality. Sampling for these three orders is referred to as EPT sampling. Because of the importance of biological success of a stream restoration project, benthic macroinvertebrate sampling will be conducted for post-restoration years 3, 4 and 5 on the Site.

Pre-construction monitoring was conducted at three sites within the project limits and at one upstream reference site in September 2006 (Figure 3). The results of this sampling event will be used as a baseline for comparison of post restoration monitoring results. Post restoration monitoring sites shall be located in the same general vicinity as the pre restoration monitoring sites. In general, post restoration monitoring results should show trends towards biological distributions similar to that observed at the reference site.

The sampling methodology shall follow the Qual 4 method listed in North Carolina Division of Water Quality's (NCDWQ) Standard Operating Procedures for Benthic Macroinvertebrates (2006). Laboratory identification of collected species will be conducted by a lab properly certified by NCDWQ.

3.4 Maintenance and Contingency Plan

Maintenance requirements vary from site to site and are generally driven by the following conditions:

- Projects without established, woody floodplain vegetation are more susceptible to erosion from floods than those with a mature, hardwood forest.
- Projects with sandy, non-cohesive soils are more prone to short-term bank erosion than cohesive soils or soils with high gravel and cobble content.
- Alluvial valley channels with wide floodplains are less vulnerable than confined channels.
- Wet weather during construction can make accurate channel and floodplain excavations difficult.
- Extreme and/or frequent flooding can cause floodplain and channel erosion.
- Extreme hot, cold, wet, or dry weather during and after construction can limit vegetation growth, particularly temporary and permanent seed.
- The presence and aggressiveness of invasive species can affect the extent to which a native buffer can be established.
- The presence of beaver can affect vegetation survivability and stream function.

Maintenance issues and recommended remediation measures will be detailed and documented in the monitoring reports. Factors that may have caused any maintenance needs, including any of the conditions listed above, shall be discussed. NCEEP approval will be obtained prior to any remedial action.

4.0 MONITORING RESULTS – 2009 YEAR 1 - MONITORING DATA

The five-year monitoring plan for the Site includes criteria to evaluate the success of the vegetation and stream components of the project. The specific locations of vegetation plots, permanent cross-sections, and the crest gauges are shown on the as-built plan sheets. Photo points, located at each of the grade control structures along the restored stream channel, are also located on the as-built plan sheets in Appendix D.

4.1 Stream Data

First year monitoring dimension and profile data were sampled in October 2009. Results from the first year monitoring samples were compared with the as-built data. Permanent cross-sections (with photos) and as-built longitudinal data, as well as the quantitative pre-construction, reference reach, and design data used to the determine restoration approach are provided in Appendix B. The locations of the permanent cross-sections are shown on the as-built plan sheets in Appendix D.

4.1.1 Cross-section, Longitudinal Profile, and Bed Material Analysis Monitoring Results

Cross Sections

The 33 permanent cross-sections along the restored channels were re-surveyed to document stream dimension at the end of monitoring Year 1. The cross-sections documented that project reaches have experienced minor adjustment within the last year.

Pool cross-sections that experienced deposition on the inner meander bend included cross-sections 4, 6, 15, 23, 27, and 33. The deposition indicates that point bar features are developing. Flow through a meander bend possesses higher conveyance velocity along its boundary with the outer bank of the

bend, and lower flow velocity along its boundary with the bend's inner bank. As flow velocity reduces, its sediment transport capacity also reduces, causing flow to drop some of its transported sediment as it slows down. Point bar formation along the inside of meander bends indicate flow velocity vectors are occurring as designed.

Riffle Cross-sections 25 and 26 aggraded slightly. The perceived aggradation reflects slight shifting of the coarse bed material rather than the deposition of fines. No deposition at these features was observed during Year 1 monitoring. These changes in channel geometry will be monitored.

Riffle Cross-sections 5, 13, 30, and 32 experienced some bed degradation. The bed scour at cross-sections 5, 13, and 32 is located along the side of channel that receives the flow vectors from upstream outer meander bends. The outside of meander bends experience an increase in shear stress during large storm events that can cause scour. This increase in shear stress isn't being dissipated as flow leaves the pool feature immediately upstream of these riffles. Cross-section 30 experienced bed scour across the entire channel. The amount of scour may reflect an inadequate pool size immediately upstream. Pool construction was difficult in areas due to the presence of bedrock. The riffle has downcut to bedrock where it has stabilized. These changes in channel geometry will be monitored but it is anticipated that these changes represent localized bed adjustments and not systemic problems that will get worse with time.

Longitudinal Profile

The Year 1 longitudinal profile was conducted during October 2009. A total of 3,416 LF was resurveyed along representative sections of the restored channels. Survey on Big Cedar Creek was conducted from As-Built Station 12+75 to 18+05 and 47+00 to 57+00. Survey on UT1 started at As-Built Station 13+75 to 30+28. The fourth section resurveyed was along UT2 from As-Built Station 11+00 to 13+00. The representative longitudinal profiles were resurveyed to document stream profile at the end of monitoring Year 1. Pool – to – pool spacing on BCC Reaches 1 and 3 changed very little since the as-built survey. Riffle slopes in these reaches also remained similar to as-built values. Riffle slopes on Reaches 1 and 2 of UT1 increased slightly. The increase may be because the channel was dry and slopes where calculated using bed slope in the absence of water surface. The pool – to – pool spacing in UT1 Reach 1 remained similar to as-built values. Pool – to – pool spacing in UT1 Reach 2 changed very little. Sinuosity was not calculated because only portions of each reach were surveyed.

The longitudinal profile and a summary of parameters measured are provided in Appendix B. Please note that this summary represents only the portions of the project that were surveyed.

Bed Material Analysis

Prior to construction, riffles were comprised of grain size particles ranging from fine clay to bedrock. The constructed riffles were seeded with onsite alluvium comprised mostly of fine gravel to large cobble size material. During Year 1 six pebble counts were performed on Big Cedar, six on UT1, and two on UT2. The majority of Year 1 pebble counts had coarser d16 particle sizes compared to pre-construction values. Overall d100 particle sizes were smaller than those collected during the existing conditions assessment. The changes in d16 and d100 values reflect the absence of fines (i.e. sand, silt, and clay) and very coarse sediment (i.e. boulders or bedrock) in the seed material. Year 1 pebble count data were plotted on a semi-log graph and will be compared with future monitoring data. All pebble count data are provided in Appendix B.

4.1.2 Bank Stability Assessments

The entire project area will be assessed for near bank stress (NBS) and bank erosion hazard index (BEHI) in 100 linear foot (LF) segments during the Year 5 monitoring period. Results will be

compared with preconstruction stability assessments. Sediment export rates will be reported in tons per year and included in the Year 5 Monitoring Report, which is scheduled for submittal in December of 2013.

4.1.3 Stream Problem Areas Plan View

The majority of constructed stream channels are functioning as designed. Observed bed adjustments include bed degradation in a few riffles, minor scour along the inner arm of a couple J-hook structures, backwatering due to improper elevation on J-hook structure invert, and slight shifts in thalweg alignment due to deposition and toe erosion. The riffles experiencing bed degradation have also had portions of their bed armor displaced. The degradation indicates that the increased shear stress that occurs in the designed pool meanders immediately upstream of these riffles isn't being dissipated during storm events. The scour observed at a couple J-hook structures along Big Cedar Creek occurred along the inner boulder arms. The scour is minor but will be monitored. Backwater conditions were observed immediately upstream of a couple J-hook structures on Big Cedar Creek. It appears that the structure inverts were set too high and have backed water upstream through riffle features. Although these conditions aren't affecting the stability of the channel, they have caused the upstream riffles to lose functionality and therefore the visual assessment scores in these areas are slightly lower. Visual assessment scores are located in Table 5.

Table B.1 (Appendix B) provides a summary of problem areas. See Figures B1- B5 in Appendix B for an overview of all stream problem areas. Table B.2 in Appendix B has additional data further explaining the visual assessment scores

Table 5. Visual Morphological Stability Assessment						
Big Cedar Creek Restoration Site: Project No. D06054-D						
BCC Reach 1 (603 LF)						
Feature	**Initial**	**MY-01**	**MY-02**	**MY-03**	**MY-04**	**MY-05**
Riffles	100%	100%				
Pools	100%	100%				
Thalweg	100%	84%				
Meanders	100%	100%				
Bed General	100%	98%				
Bank Conition	100%	100%				
Vanes / J Hooks etc.	-----	-----				
Wads and Boulders	100%	100%				
BCC Reach 2 (2239 LF)						
Feature	**Initial**	**MY-01**	**MY-02**	**MY-03**	**MY-04**	**MY-05**
Riffles	100%	84%				
Pools	100%	100%				
Thalweg	100%	100%				
Meanders	100%	100%				
Bed General	100%	96%				
Bank Conition	100%	100%				
Vanes / J Hooks etc.	100%	93%				
Wads and Boulders	100%	94%				
BCC Reach 3 (1827 LF)						
Feature	**Initial**	**MY-01**	**MY-02**	**MY-03**	**MY-04**	**MY-05**
Riffles	100%	97%				
Pools	100%	100%				
Thalweg	100%	100%				
Meanders	100%	100%				
Bed General	100%	100%				
Bank Condition	100%	94%				
Vanes / J Hooks etc.	100%	96%				
Wads and Boulders	100%	100%				
BCC Reach 4 (410 LF)						
Feature	**Initial**	**MY-01**	**MY-02**	**MY-03**	**MY-04**	**MY-05**
Riffles	100%	100%				
Pools	100%	100%				
Thalweg	100%	100%				
Meanders	100%	92%				
Bed General	100%	98%				
Bank Condition	100%	88%				
Vanes / J Hooks etc.	100%	100%				
Wads and Boulders	100%	100%				

Table 5. Visual Morphological Stability Assessment						
Big Cedar Creek Restoration Site: Project No. D06054-D						
BCC Reach 6 (969 LF)						
Feature	**Initial**	**MY-01**	**MY-02**	**MY-03**	**MY-04**	**MY-05**
Riffles	100%	100%				
Pools	100%	100%				
Thalweg	100%	100%				
Meanders	100%	100%				
Bed General	100%	100%				
Bank Condition	100%	100%				
Vanes / J Hooks etc.	100%	100%				
Wads and Boulders	-----	-----				
UT1 Reach 1 (1248 LF)						
Feature	**Initial**	**MY-01**	**MY-02**	**MY-03**	**MY-04**	**MY-05**
Riffles	100%	100%				
Pools	100%	100%				
Thalweg	100%	100%				
Meanders	100%	100%				
Bed General	100%	100%				
Bank Condition	100%	100%				
Vanes / J Hooks etc.	-----	-----				
Wads and Boulders	100%	100%				
UT1 Reach 2 (1016)						
Feature	**Initial**	**MY-01**	**MY-02**	**MY-03**	**MY-04**	**MY-05**
Riffles	100%	100%				
Pools	100%	100%				
Thalweg	100%	100%				
Meanders	100%	100%				
Bed General	100%	100%				
Bank Condition	100%	100%				
Vanes / J Hooks etc.	100%	100%				
Wads and Boulders	100%	100%				
UT1 Reach 3 (1885 LF)						
Feature	**Initial**	**MY-01**	**MY-02**	**MY-03**	**MY-04**	**MY-05**
Riffles	100%	98%				
Pools	100%	100%				
Thalweg	100%	100%				
Meanders	100%	100%				
Bed General	100%	100%				
Bank Condition	100%	97%				
Vanes / J Hooks etc.	100%	100%				
Wads and Boulders	100%	100%				

Table 5. Visual Morphological Stability Assessment						
Big Cedar Creek Restoration Site: Project No. D06054-D						
UT1 Reach 4 (996 LF)						
Feature	**Initial**	**MY-01**	**MY-02**	**MY-03**	**MY-04**	**MY-05**
Riffles	100%	87%				
Pools	100%	90%				
Thalweg	100%	100%				
Meanders	100%	100%				
Bed General	100%	76%				
Bank Condition	100%	90%				
Vanes / J Hooks etc.	100%	100%				
Wads and Boulders	100%	100%				
UT1A (85 LF)						
Feature	**Initial**	**MY-01**	**MY-02**	**MY-03**	**MY-04**	**MY-05**
Riffles	-----	-----				
Pools	-----	-----				
Thalweg	-----	-----				
Meanders	-----	-----				
Bed General	100%	100%				
Bank Condition	100%	100%				
Vanes / J Hooks etc.	-----	-----				
Wads and Boulders	-----	-----				
UT1B (34 LF)						
Feature	**Initial**	**MY-01**	**MY-02**	**MY-03**	**MY-04**	**MY-05**
Riffles	-----	-----				
Pools	-----	-----				
Thalweg	-----	-----				
Meanders	-----	-----				
Bed General	100%	100%				
Bank Condition	100%	100%				
Vanes / J Hooks etc.	100%	100%				
Wads and Boulders	-----	-----				
UT1C (78 LF)						
Feature	**Initial**	**MY-01**	**MY-02**	**MY-03**	**MY-04**	**MY-05**
Riffles	-----	-----				
Pools	-----	-----				
Thalweg	-----	-----				
Meanders	-----	-----				
Bed General	100%	100%				
Bank Condition	100%	100%				
Vanes / J Hooks etc.	-----	-----				
Wads and Boulders	-----	-----				

Table 5. Visual Morphological Stability Assessment						
Big Cedar Creek Restoration Site: Project No. D06054-D						
UT2 (609 LF)						
Feature	**Initial**	**MY-01**	**MY-02**	**MY-03**	**MY-04**	**MY-05**
Riffles	100%	100%				
Pools	100%	100%				
Thalweg	100%	100%				
Meanders	100%	100%				
Bed General	100%	100%				
Bank Condition	100%	100%				
Vanes / J Hooks etc.	100%	100%				
Wads and Boulders	100%	100%				
UT3 (73 LF within easement)						
Feature	**Initial**	**MY-01**	**MY-02**	**MY-03**	**MY-04**	**MY-05**
Riffles	-----	-----				
Pools	-----	-----				
Thalweg	-----	-----				
Meanders	-----	-----				
Bed General	100%	100%				
Bank Condition	100%	100%				
Vanes / J Hooks etc.	100%	100%				
Wads and Boulders	-----	-----				

4.2 Hydrology Data

The on-site crest gauges documented the occurrence of one bankfull event during the first year monitoring period. The highest stage recorded during the first year monitoring period was 0.25 feet. Bankfull verification summaries are included in Table 6. Crest gauge locations are included in the as-built plan sheets in Appendix D. Bankfull verification photos are provided in Appendix E.

Table 6. Verification of Bankful Events

Big Cedar Creek Restoration Site: Project No. D06054-D					
Station Number	Date of Data Collection	Date of Occurrence of Bankfull Event	Method of Data Collection	Gage Height (feet)	Photo # (If available)
BCC Reach 3	3/4/09	Unknown	Crest Gauge	0.20	BCC CG
UT1 Reach 4	3/4/09	Unknown	Crest Gauge	0.25	UT1 CG

4.3 Vegetation Data

Bare-root trees and shrubs were planted within all areas of the conservation easement. A minimum 50-foot buffer was established along all restored stream reaches. In general, bare-root vegetation was planted at a target density of 680 stems per acre, in an 8-foot by 8-foot grid pattern. Planting of bare-root trees and shrubs were completed in February 2009.

The restoration plan for the Site specifies that the number of quadrants required is based on the CVS-NCEEP monitoring guidance. The number of quadrants required was determined using the plot number spreadsheet (07312006-2) provided by NCEEP that captures five percent of the total conservation easement. The sizes of individual quadrants are 100 square meters. A total of 23 vegetation plots, each 10 meters by 10 meters in size, were established across the restored site. The average Year 1 density of planted bare root stems, based on the data from the 23 monitoring plots, is 822 stems per acre. The locations of the vegetation plots are shown on the as-built plan sheets in Appendix D.

Additional vegetation related information is listed below. Monitoring result tables and photos are located in Appendix C.

4.3.1 Vegetative Problem Areas

Minor vegetation issues include areas of bare bank and floodplain as well as the presence of invasives. The majority of bare bank areas are small pockets where matting has been damaged. Bare floodplain areas were noted along UT1. (The soil in these areas is very rocky, and vegetation hasn't fully established yet.) The invasive species present included ligustrum and multiflora rose.

See Table 6 in Appendix C for problem area categories, locations, descriptions, causes, and photo log.

4.3.2 Vegetative Problem Area Plan View

See Figures C1-C8 in Appendix C for an overview of all vegetative problem areas.

4.4 Areas of Concern

Overall the restored channels are functioning as designed with few areas of concern. The areas of concern are the areas of observed bed degradation along Big Cedar Creek and UT1. These areas will be monitored and may require future maintenance. Invasive species will also be monitored.

5.0 REFERENCES

Lee, M., Peet R., Roberts, S., Wentworth, T. CVS-NCEEP Protocol for Recording Vegetation, Version 4.1, 2007.

North Carolina Division of Water Quality (NCDWQ). 2001. Interim, Internal Technical Guide: Benthic Macroinvertebrate Monitoring Protocols for Compensatory Stream Restoration Projects.

North Carolina Division of Water Quality (NCDWQ). 2006. Standard Operating Procedures for Benthic Macroinvertebrates.

Rosgen, D. L. 1994. A Classification of Natural Rivers. Catena 22:169-199.

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Schafale, Michael P. and Alan S. Weakley. 1990. Classification of the Natural Communities of North Carolina. North Carolina Heritage Program, Raleigh, NC.

US Army Corps of Engineers, Wetland Research Program (WRP), 1997. Technical Note VN-RS-4.1.

US Army Corps of Engineers, WRP, July 2000. Technical Notes ERDC TN-WRAP-00-02.

US Army Corps of Engineers, 2003. Stream Mitigation Guidelines. Prepared with cooperation from US Environmental Protection Agency, NC Wildlife Resources Commission, and the NC Division of Water Quality. www.saw.usace.army.mil/wetlands/Mitigation/stream_mitigation.html

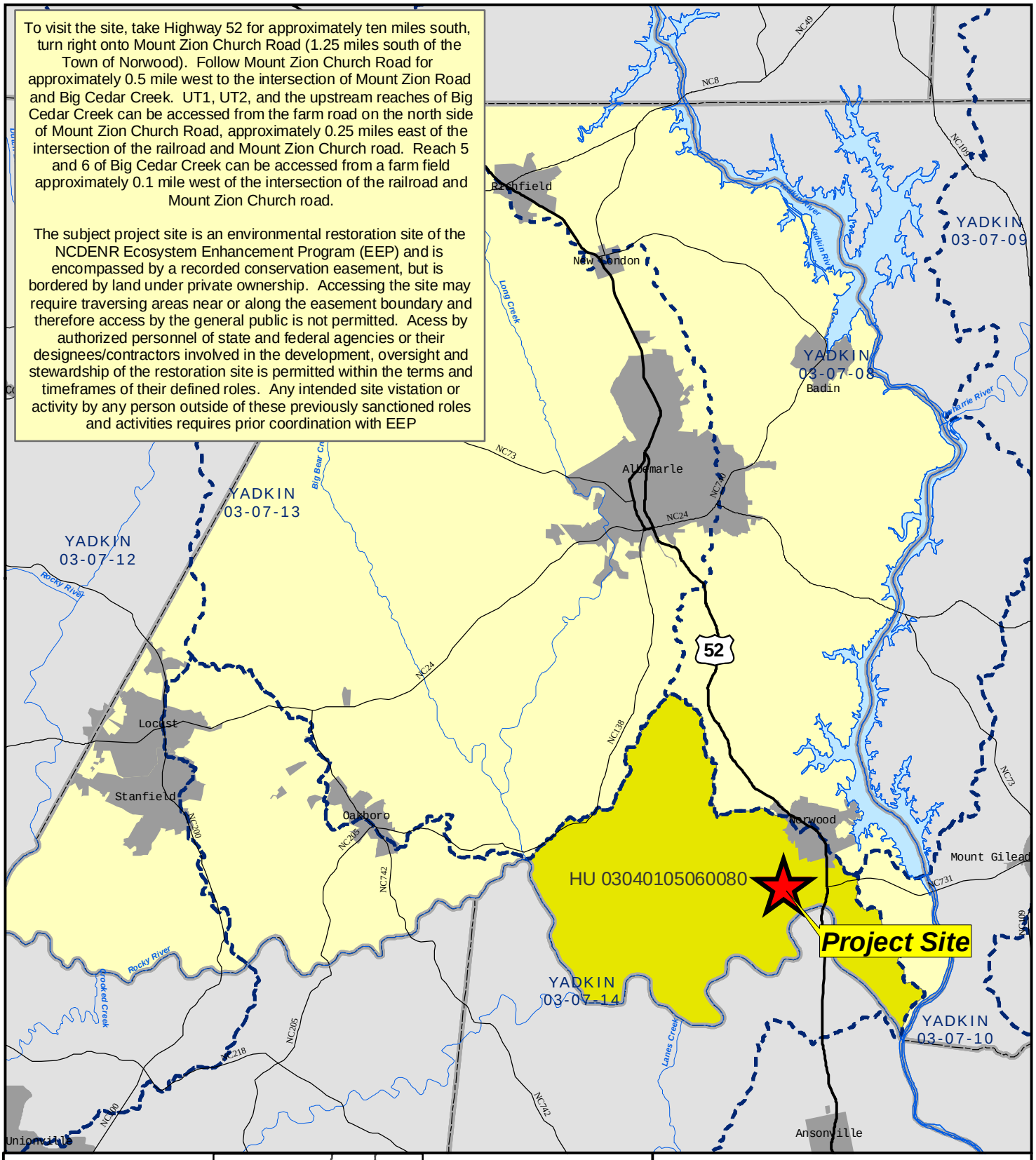
Appendix A

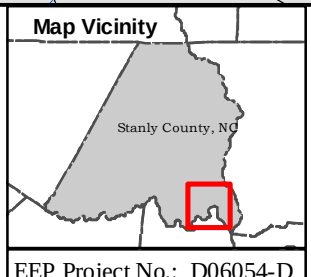
Figures

1. Vicinity Map
2. Project Summary Map
3. Macroinvertebrate Monitoring Map

To visit the site, take Highway 52 for approximately ten miles south, turn right onto Mount Zion Church Road (1.25 miles south of the Town of Norwood). Follow Mount Zion Church Road for approximately 0.5 mile west to the intersection of Mount Zion Road and Big Cedar Creek. UT1, UT2, and the upstream reaches of Big Cedar Creek can be accessed from the farm road on the north side of Mount Zion Church Road, approximately 0.25 miles east of the intersection of the railroad and Mount Zion Church road. Reach 5 and 6 of Big Cedar Creek can be accessed from a farm field approximately 0.1 mile west of the intersection of the railroad and Mount Zion Church road.

The subject project site is an environmental restoration site of the NCDENR Ecosystem Enhancement Program (EEP) and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site may require traversing areas near or along the easement boundary and therefore access by the general public is not permitted. Acess by authorized personnel of state and federal agencies or their designees/contractors involved in the development, oversight and stewardship of the restoration site is permitted within the terms and timeframes of their defined roles. Any intended site vistation or activity by any person outside of these previously sanctioned roles and activities requires prior coordination with EEP





EEP Project No.: D06054-D

LEGEND

- USGS Hydrologic Unit
- NCDWQ Sub-basin
- Counties

0 2 4 Miles

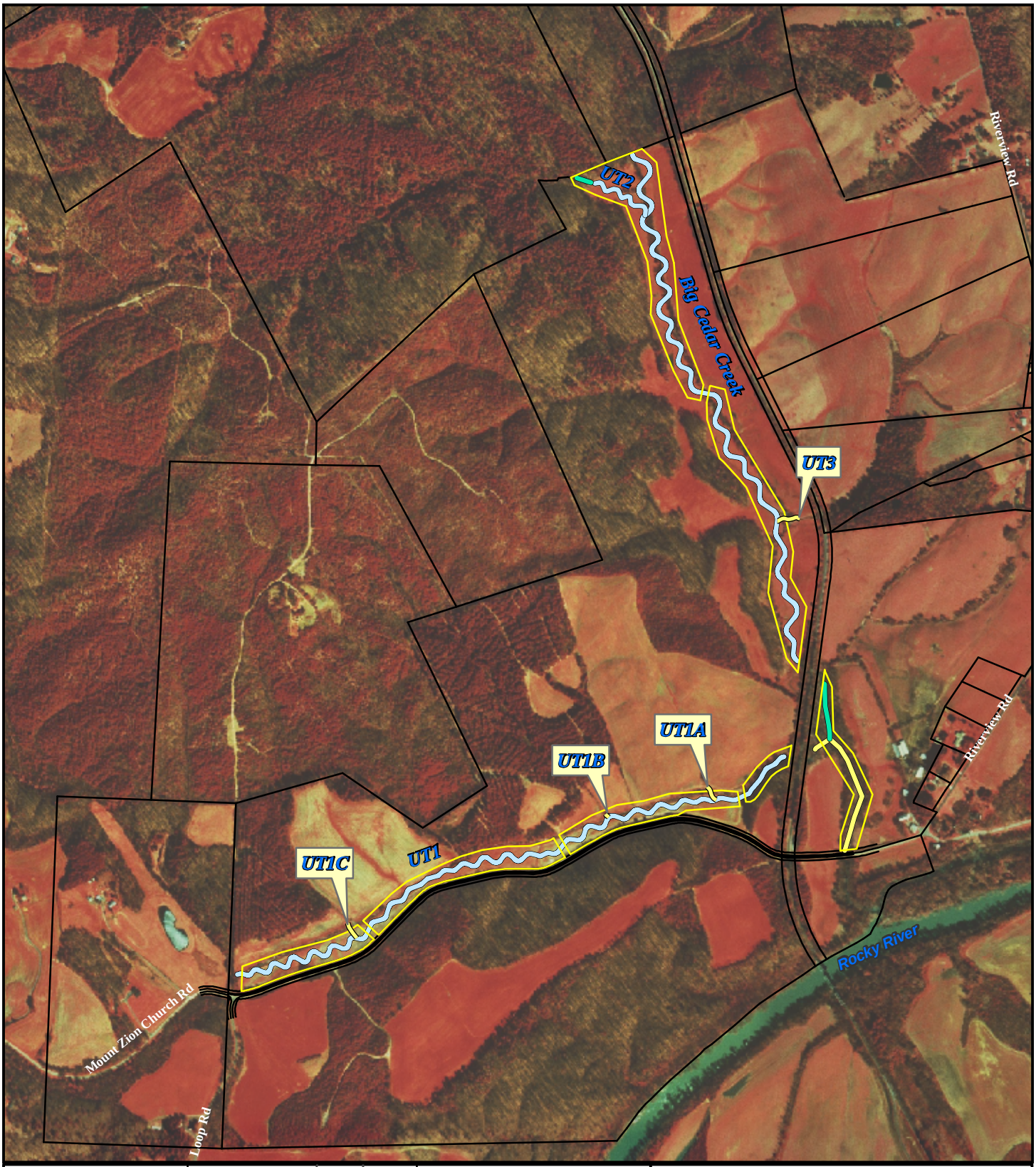
Figure 1: Vicinity Map

Big Cedar Creek Stream Restoration Project

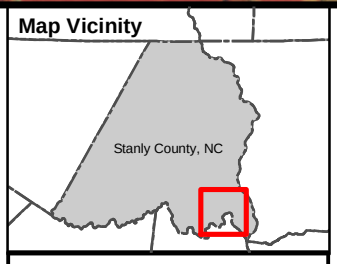
Annual Monitoring Plan - Year 1

Stanly County, NC

April 2010



Map Vicinity



EEP Project No. : D06054-D

LEGEND

- Preservation
- Enhancement
- Restoration
- Parcels
- Conservation Easement

0 400 800 Feet

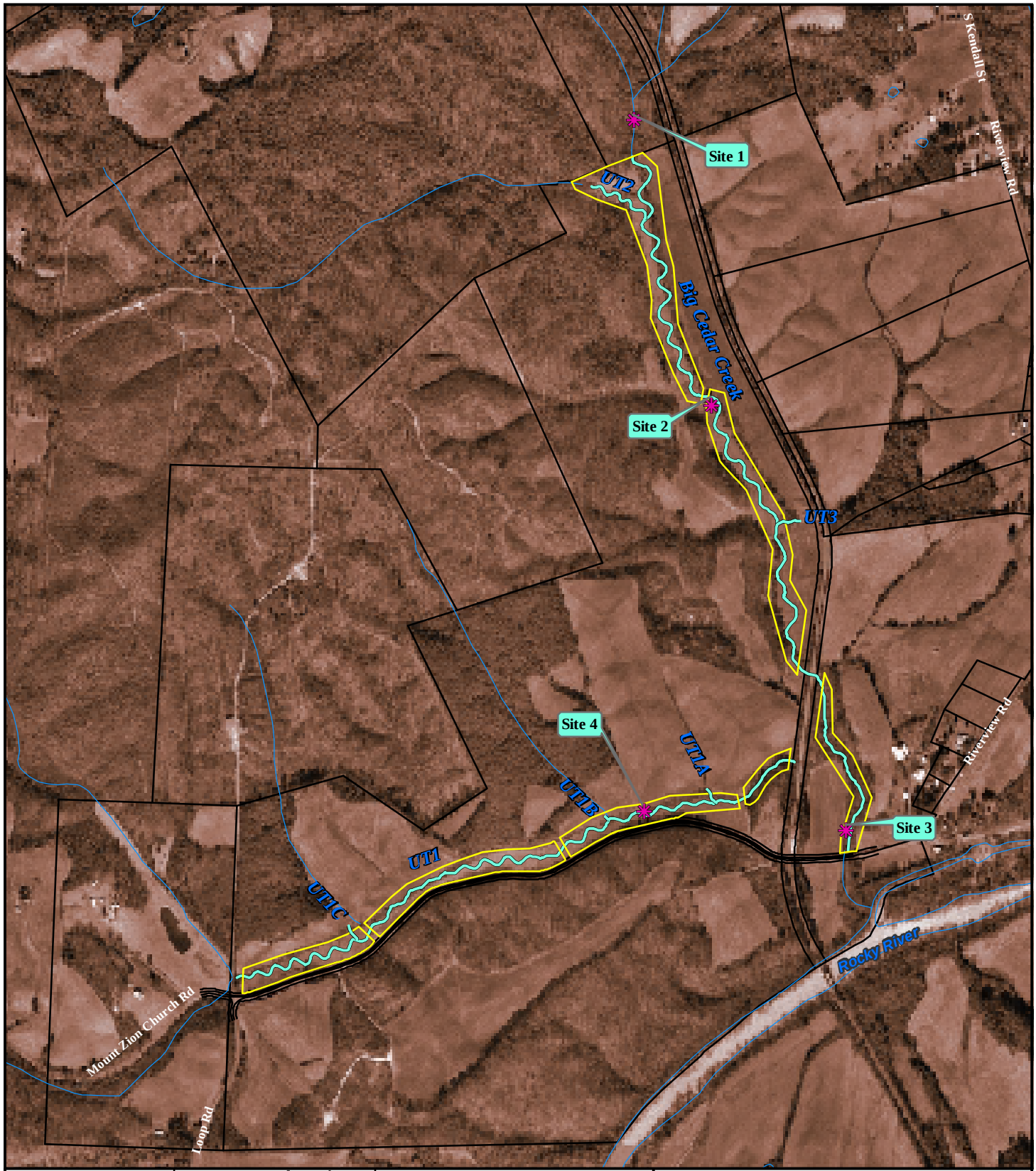
Figure 2: Restoration Summary

Big Cedar Creek Stream Restoration Project

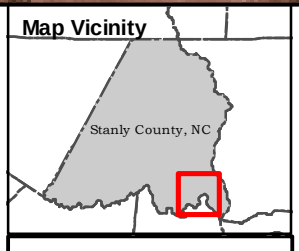
Annual Monitoring Plan - Year 1

Stanly County, NC

April 2010



Map Vicinity



EEP Project No. : D06054-D

LEGEND

- As-Built Streams
- Macroinvertebrate Sampling Sites
- Conservation Easement
- Parcels
- Streams

0 400 800 Feet

Figure 3: Benthic Macroinvertebrate Sampling Sites
Big Cedar Creek Stream Restoration Project
Annual Monitoring Plan - Year 1
Stanly County, NC

April 2010

Appendix B

Morphological Summary Data

Cross-section Plots

Profile Plots

Sediment Data

Morphology Data Table 7 & 8

Tables B.1 & B.2

Figure B1- B5

Representative Stream Problem Area Figures 1- 5

Representative Stream Problem Area Photos

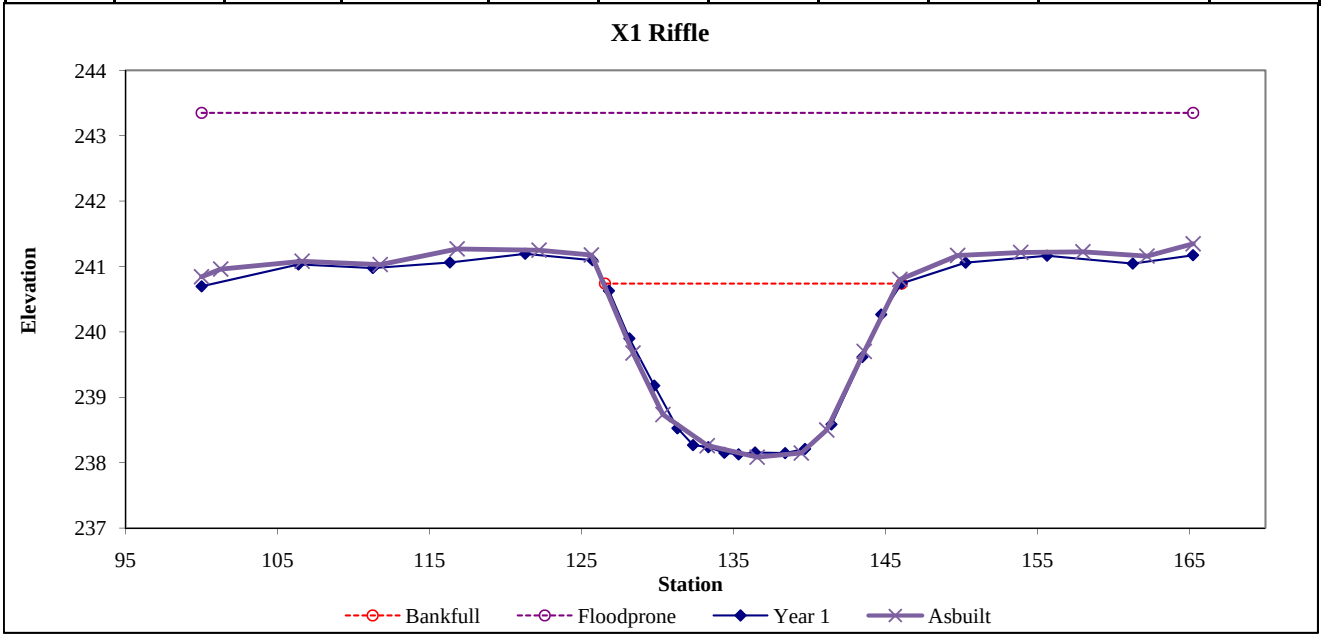
Permanent Cross Section X1

(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	E	35.6	19.52	1.82	2.61	10.71	1	3.3	240.74	240.74

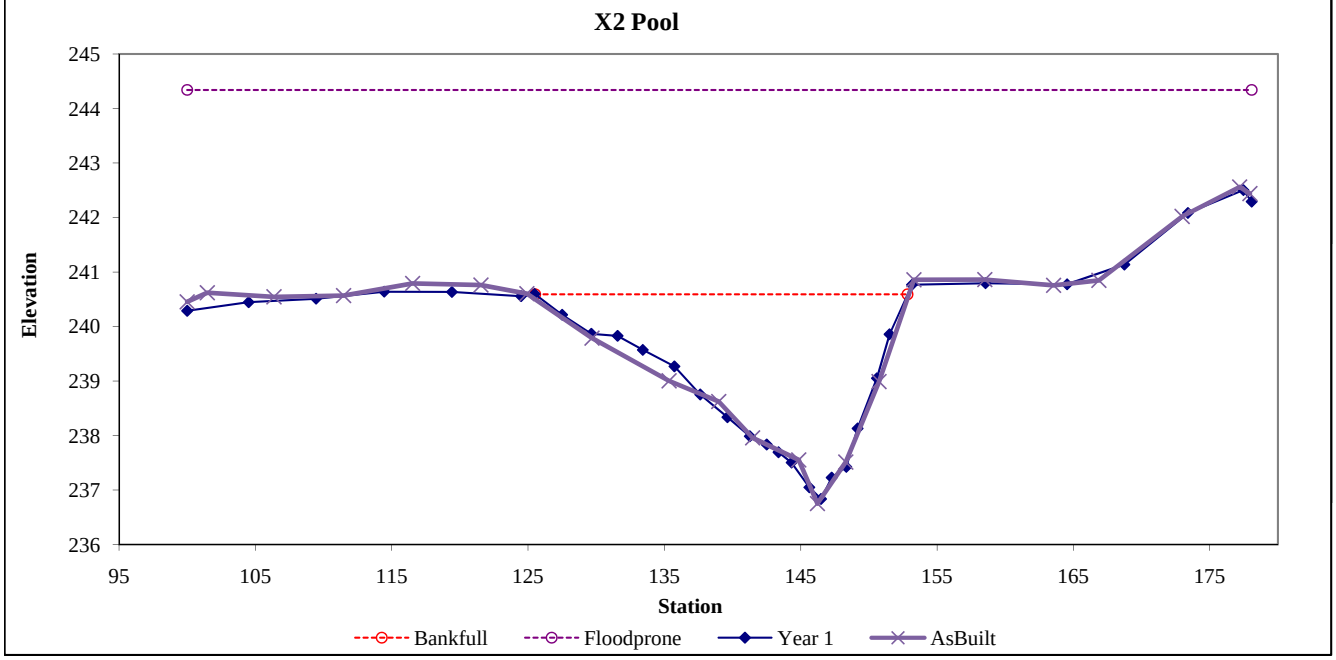


Permanent Cross Section X2
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		47.5	27.32	1.74	3.75	15.73	1		240.59	240.6

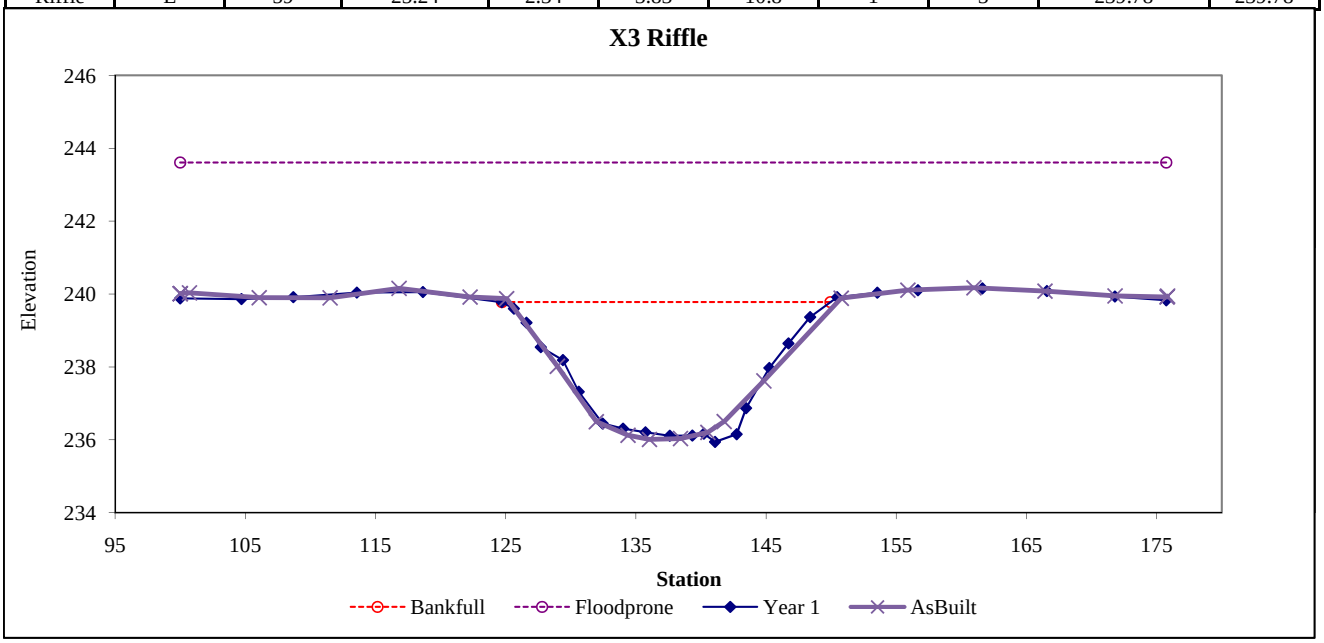


Permanent Cross Section X3
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	E	59	25.24	2.34	3.83	10.8	1	3	239.78	239.78

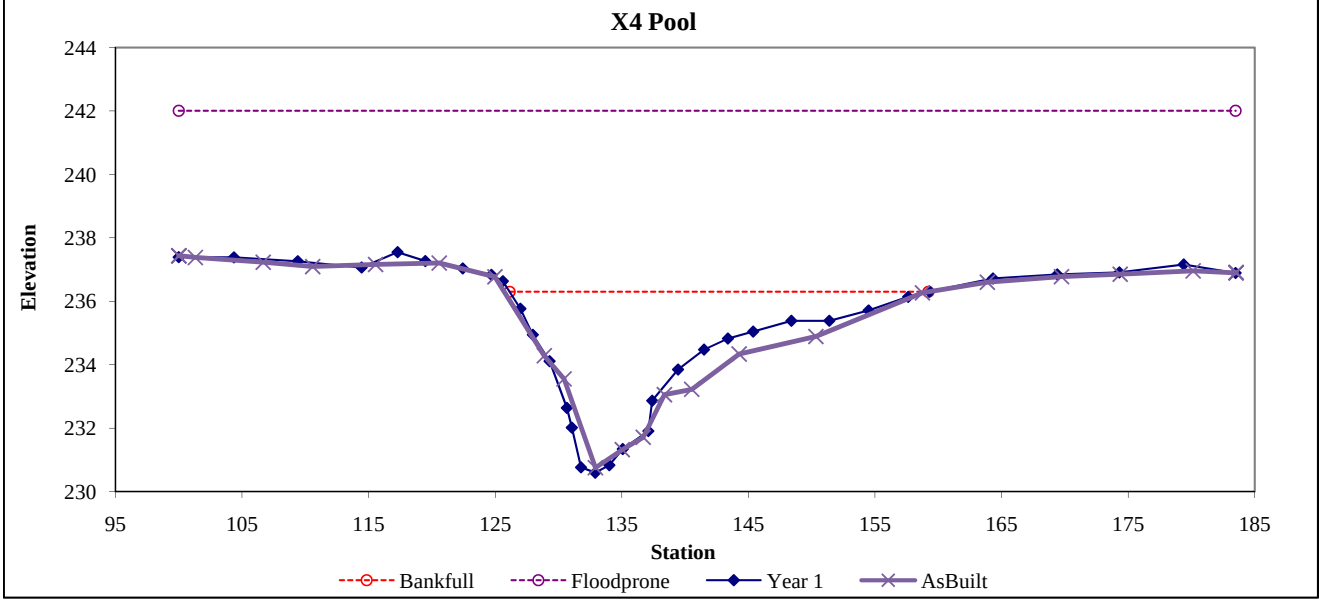


Permanent Cross Section X4
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		67.2	33.08	2.03	5.71	16.28	1		236.3	236.31

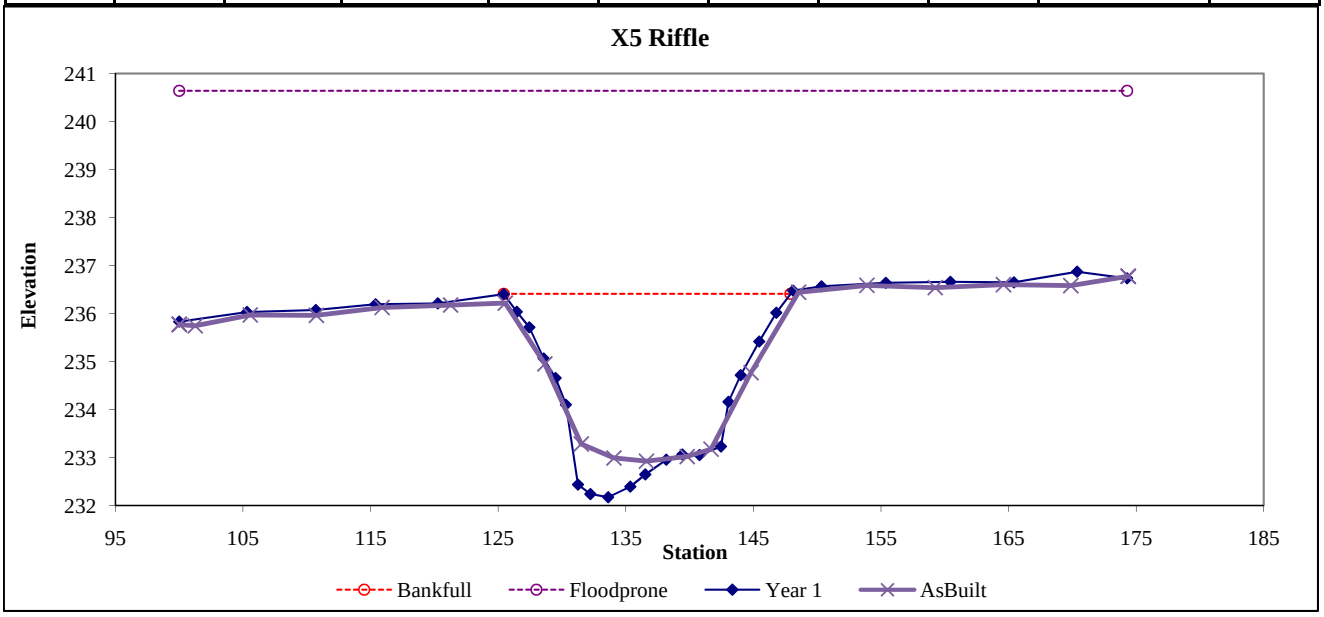


Permanent Cross Section X5
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	E	56.2	22.47	2.5	4.23	8.99	1	3.3	236.41	236.41

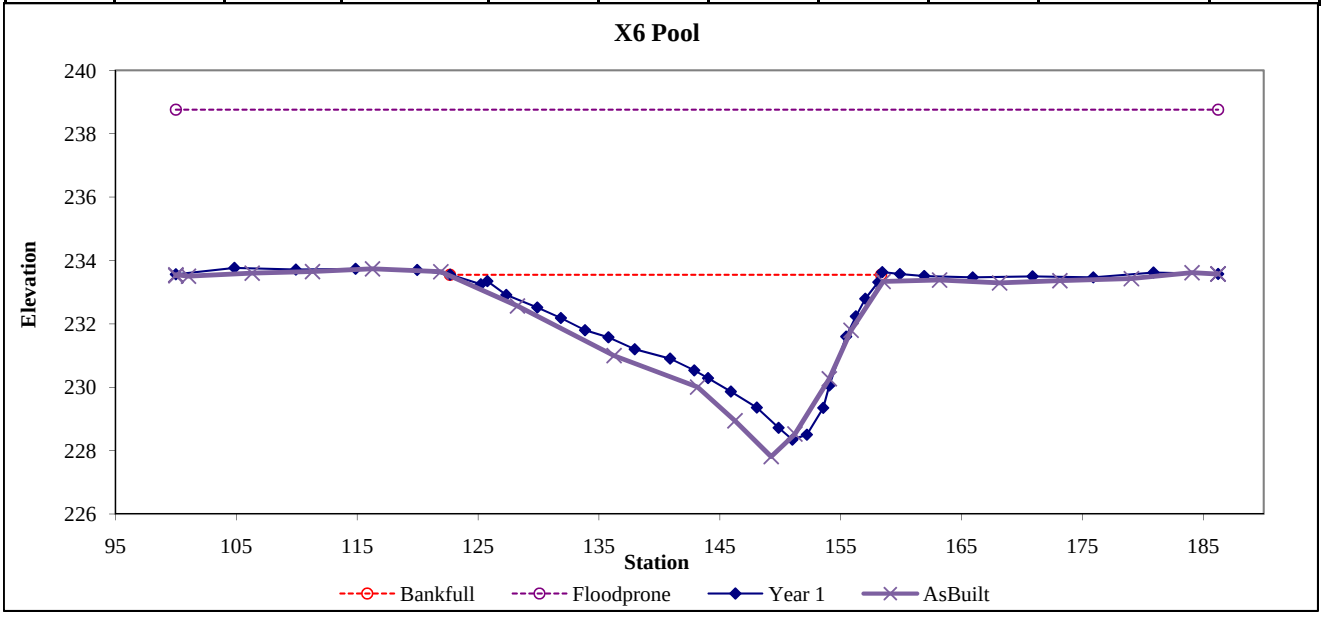


Permanent Cross Section X6
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

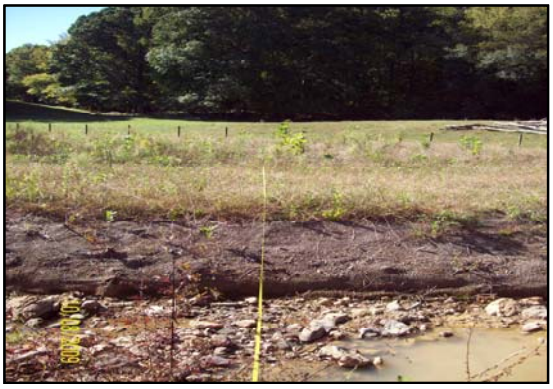
Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		83.4	35.67	2.34	5.21	15.25	1		233.55	233.55



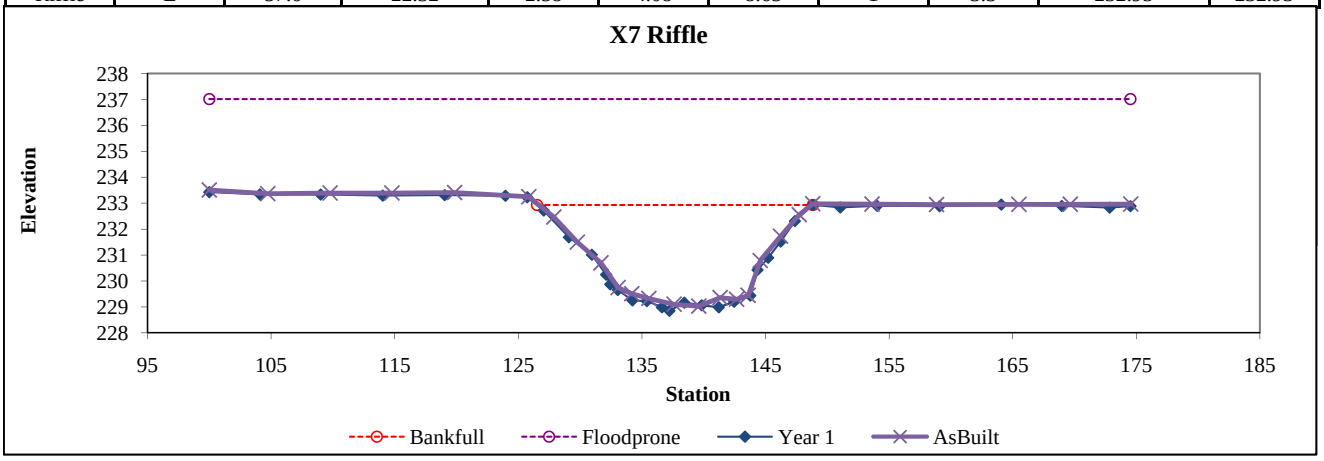
Permanent Cross Section X7
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	E	57.6	22.32	2.58	4.08	8.65	1	3.3	232.93	232.93

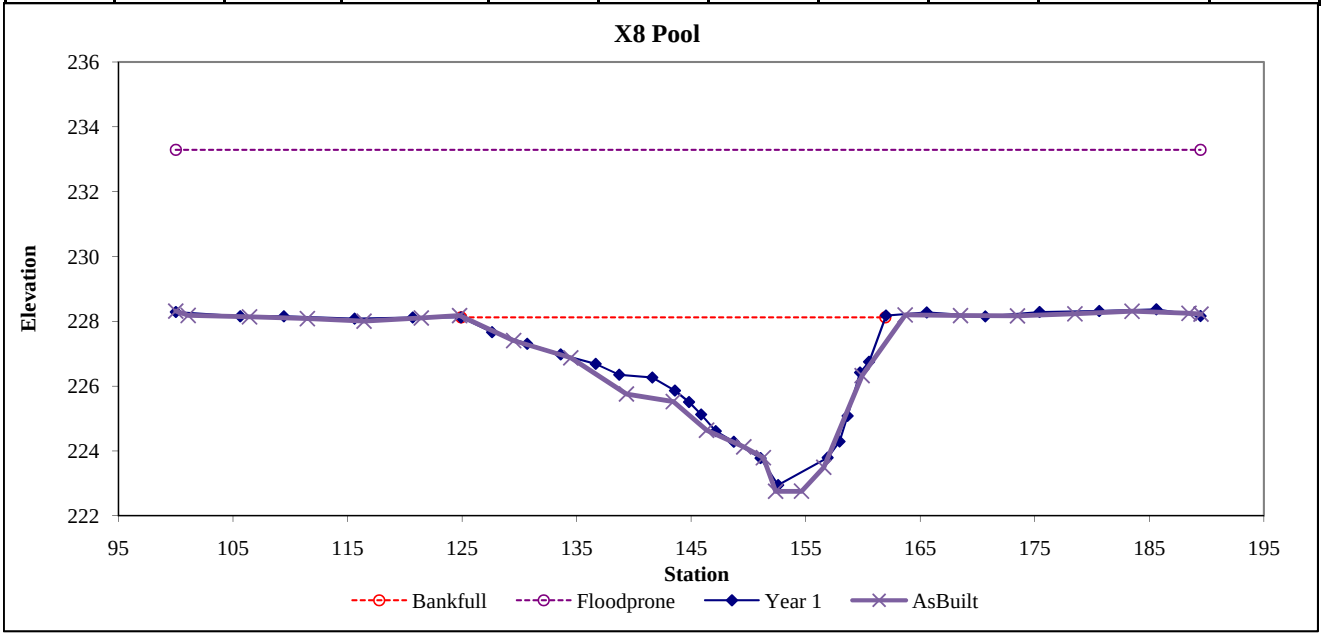


Permanent Cross Section X8
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		86.6	37.03	2.34	5.17	15.84	1		228.12	228.12

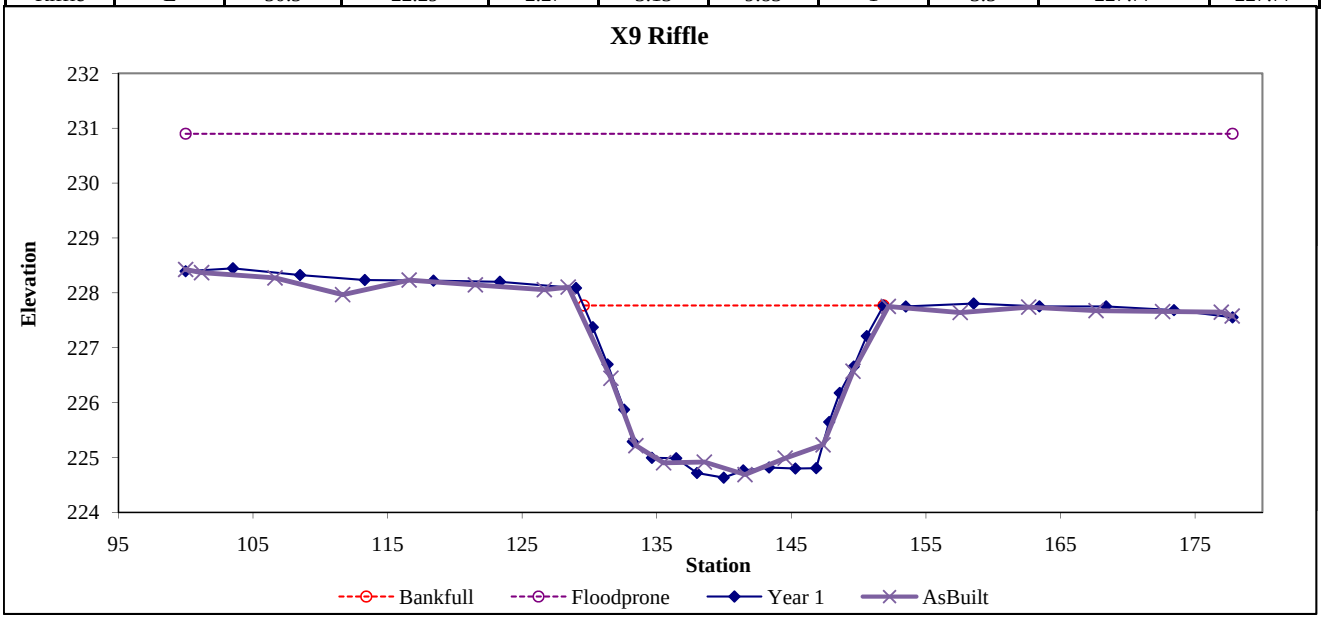


Permanent Cross Section X9
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	E	50.5	22.29	2.27	3.13	9.83	1	3.5	227.77	227.77

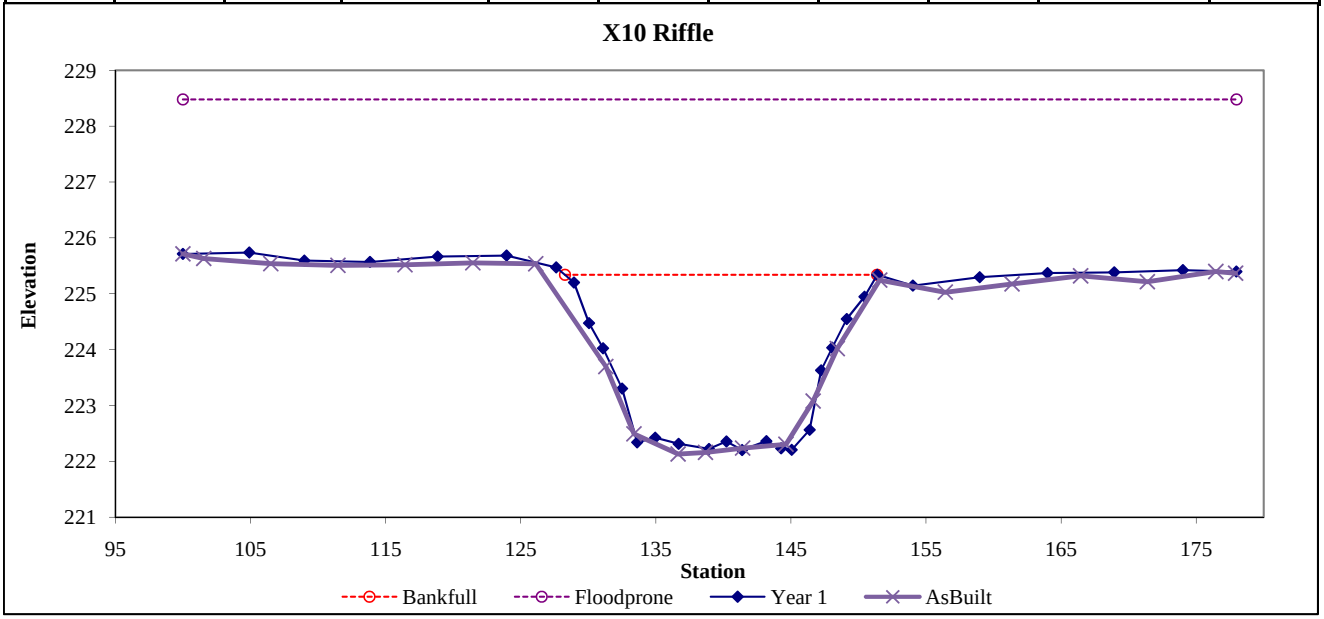


Permanent Cross Section X10
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	E	50.8	23.12	2.2	3.14	10.51	1	3.4	225.34	225.34

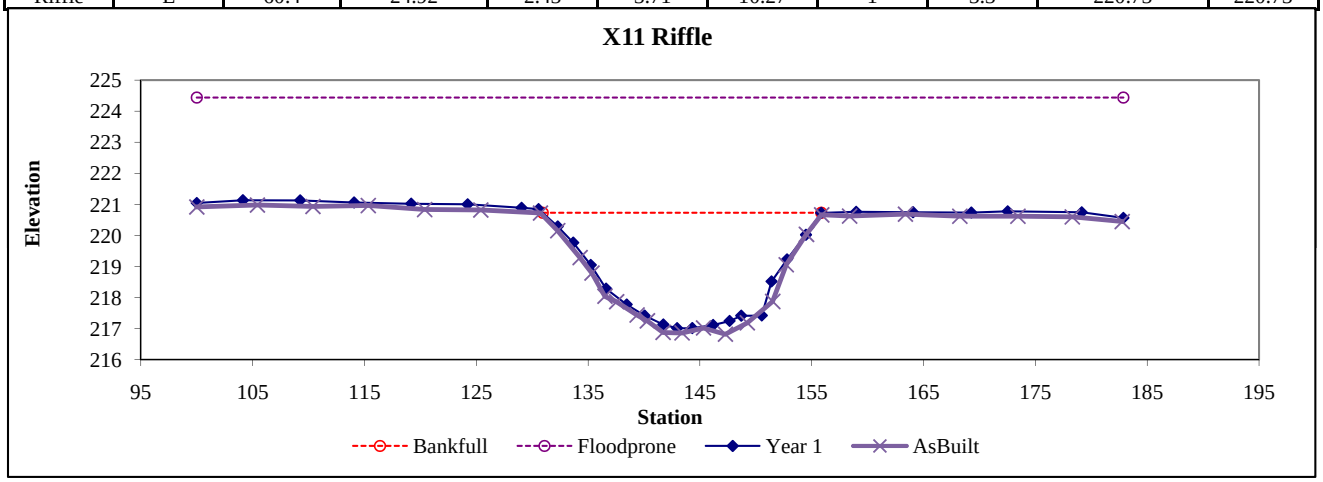


Permanent Cross Section X11
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	E	60.4	24.92	2.43	3.71	10.27	1	3.3	220.73	220.73

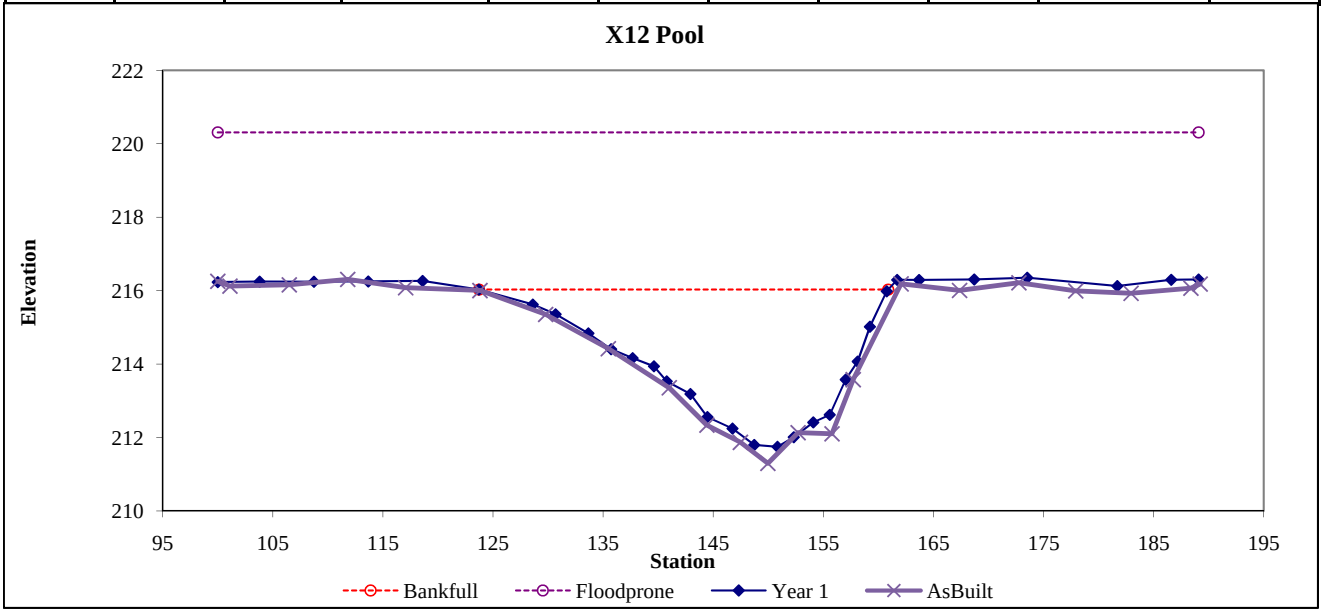


Permanent Cross Section X12
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		80.7	37.17	2.17	4.28	17.11	1		216.03	216.03

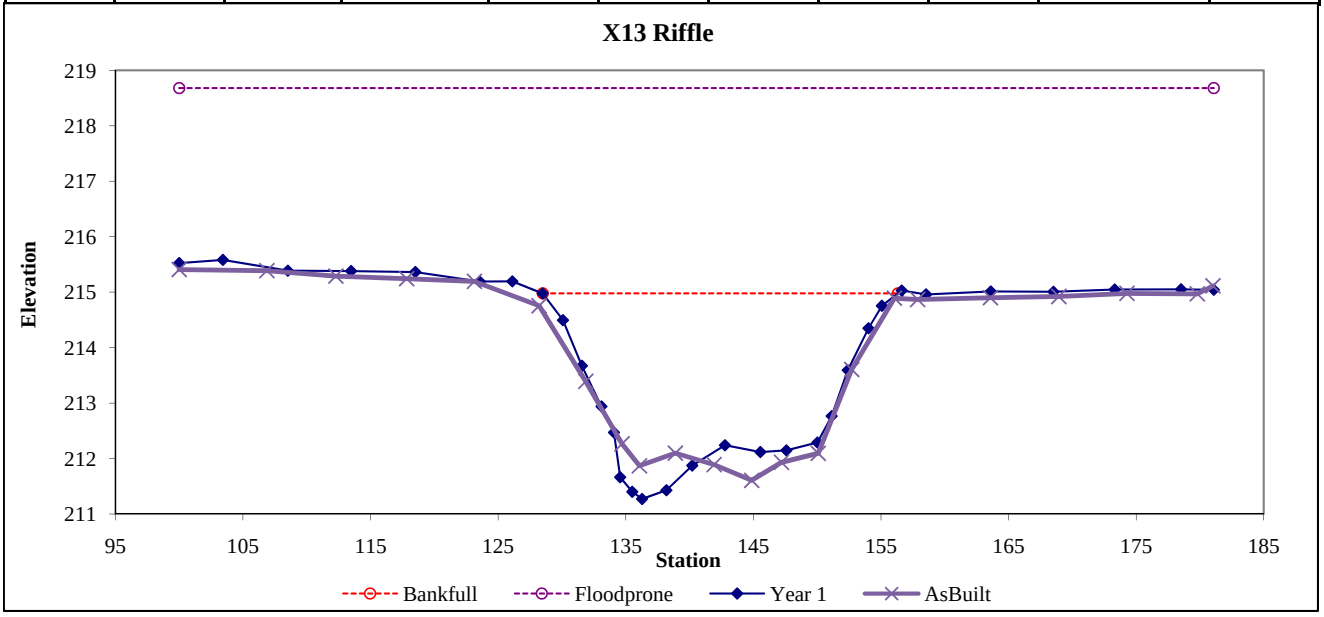


Permanent Cross Section X13
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	62.6	27.84	2.25	3.71	12.38	1	2.9	214.98	214.98

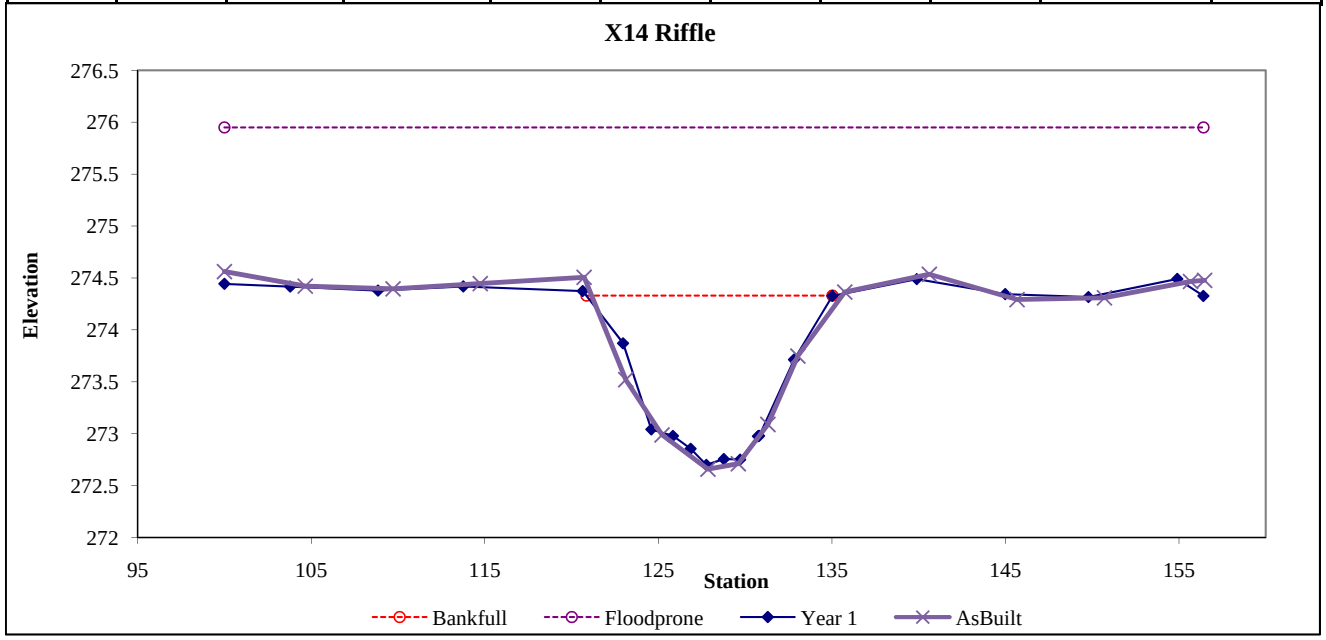


Permanent Cross Section X14
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	13.7	14.16	0.97	1.63	14.63	1	4	274.33	274.33

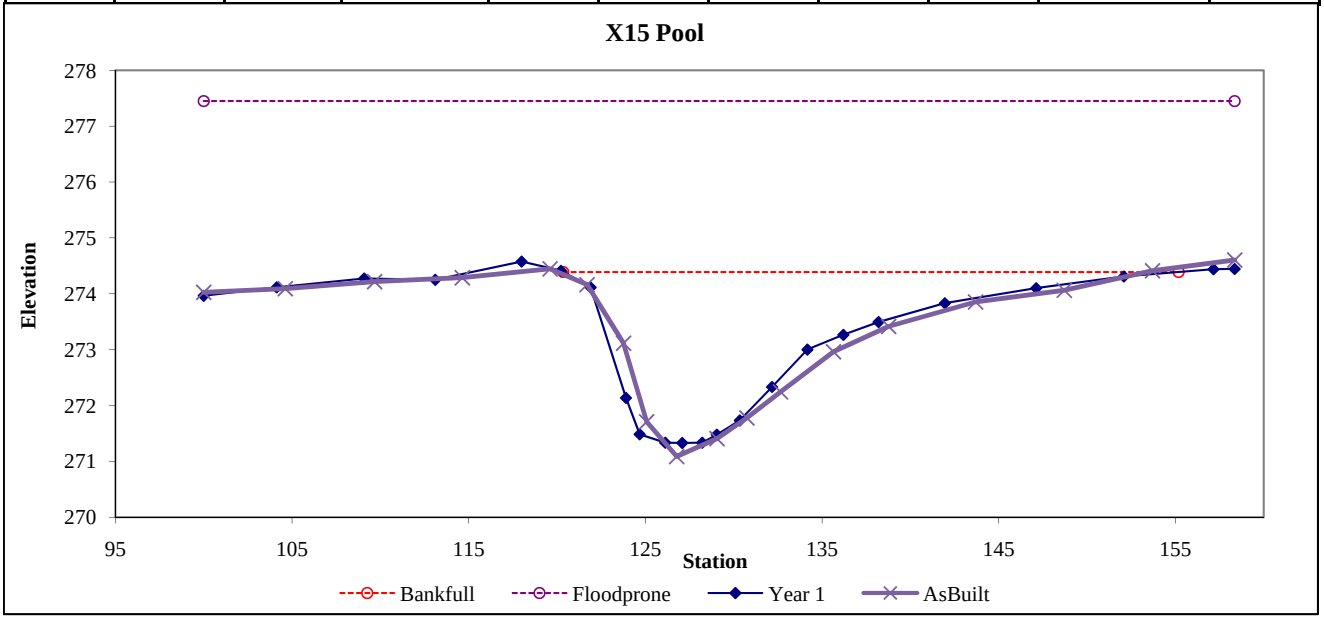


Permanent Cross Section X15
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

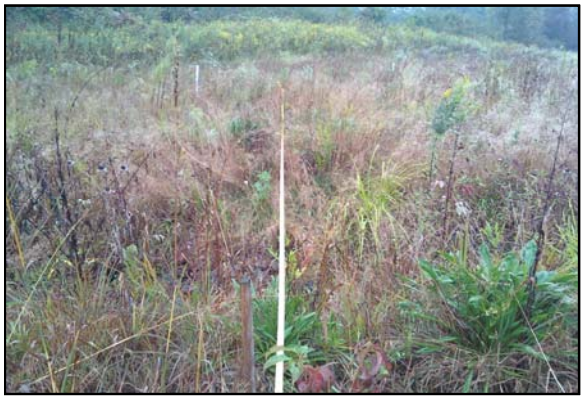
Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		39.8	34.83	1.14	3.06	30.46	1	1.7	274.39	274.31



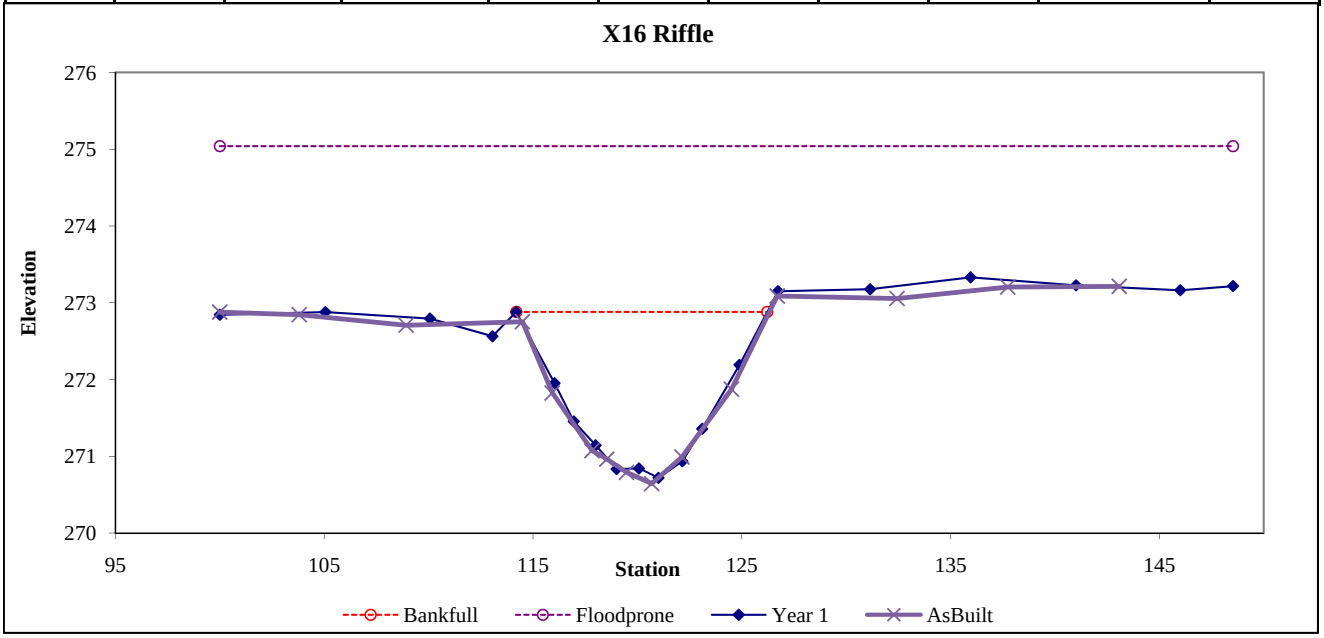
Permanent Cross Section X16
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	E	16.1	12.02	1.34	2.16	8.99	1	4	272.88	272.88

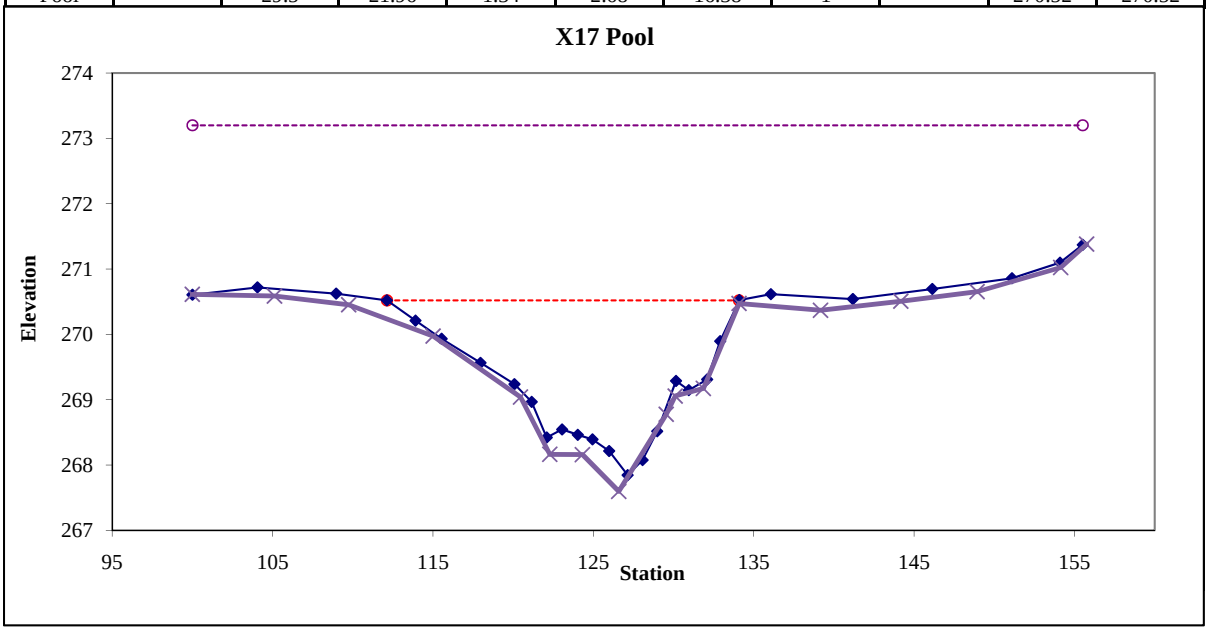


Permanent Cross Section X17
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		29.5	21.96	1.34	2.68	16.38	1		270.52	270.52

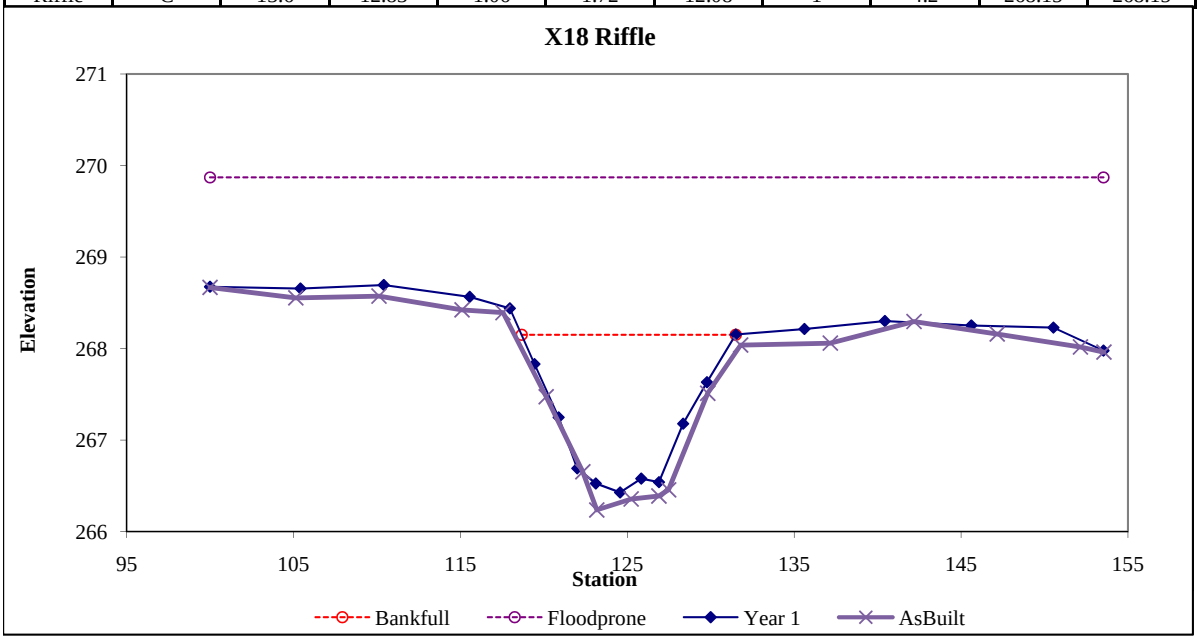


Permanent Cross Section X18
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	13.6	12.83	1.06	1.72	12.08	1	4.2	268.15	268.15

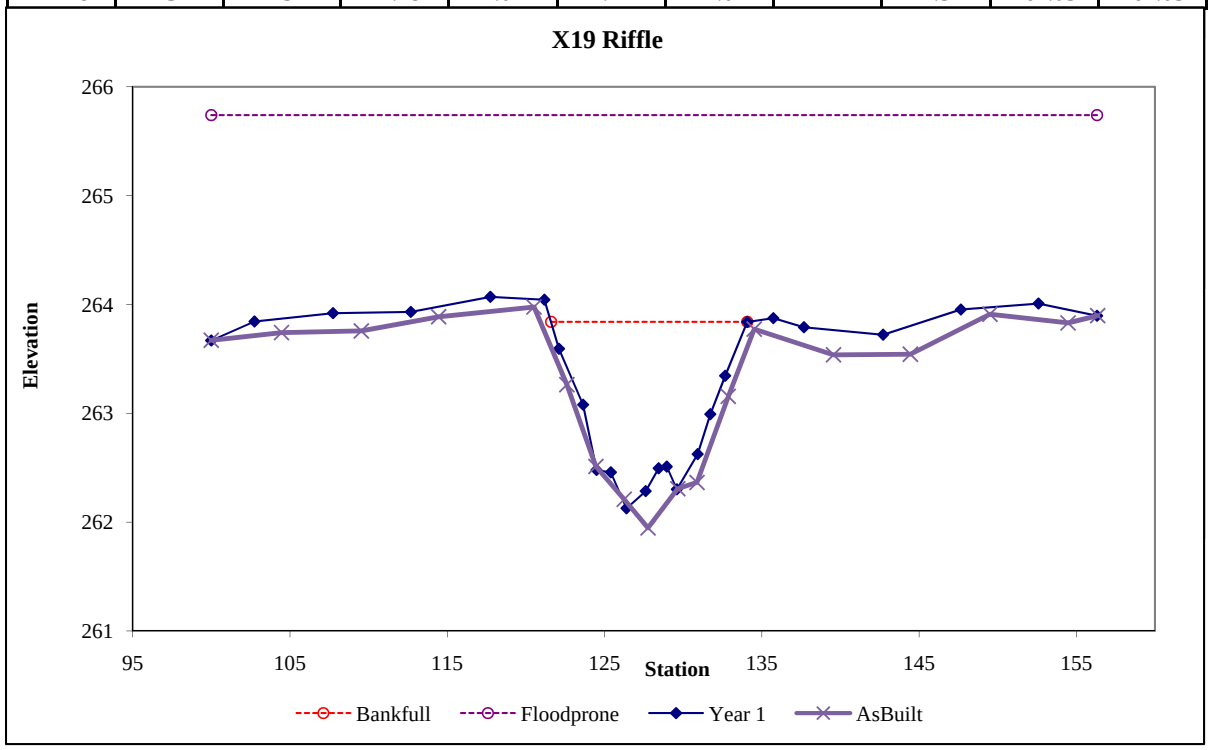


Permanent Cross Section X19
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	13	12.48	1.04	1.71	12.02	1	4.5	264.03	264.03

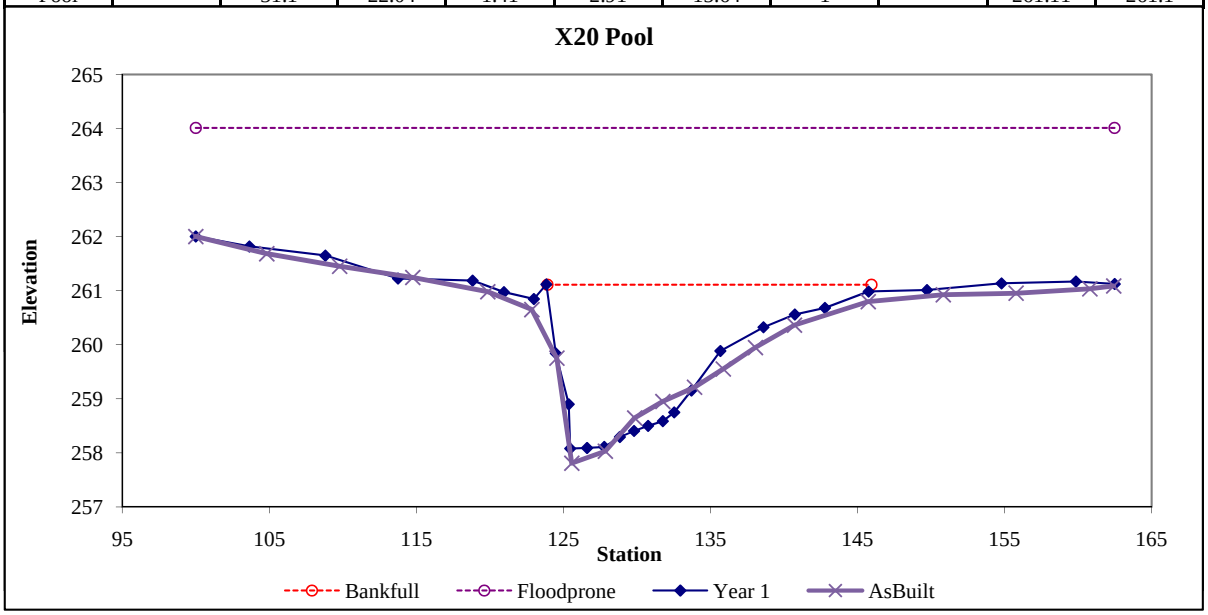


Permanent Cross Section X20
(Year 1 Monitoring Data - collected October 2009)

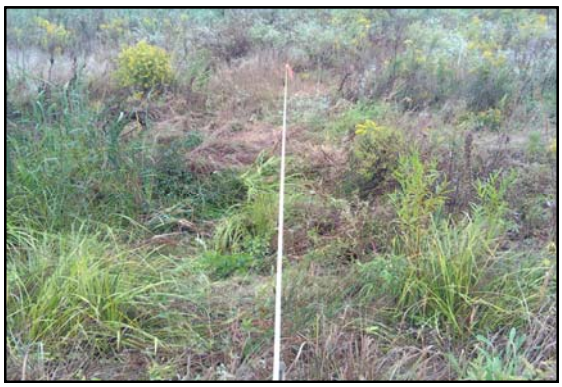
Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		31.1	22.04	1.41	2.91	15.64	1		261.11	261.1



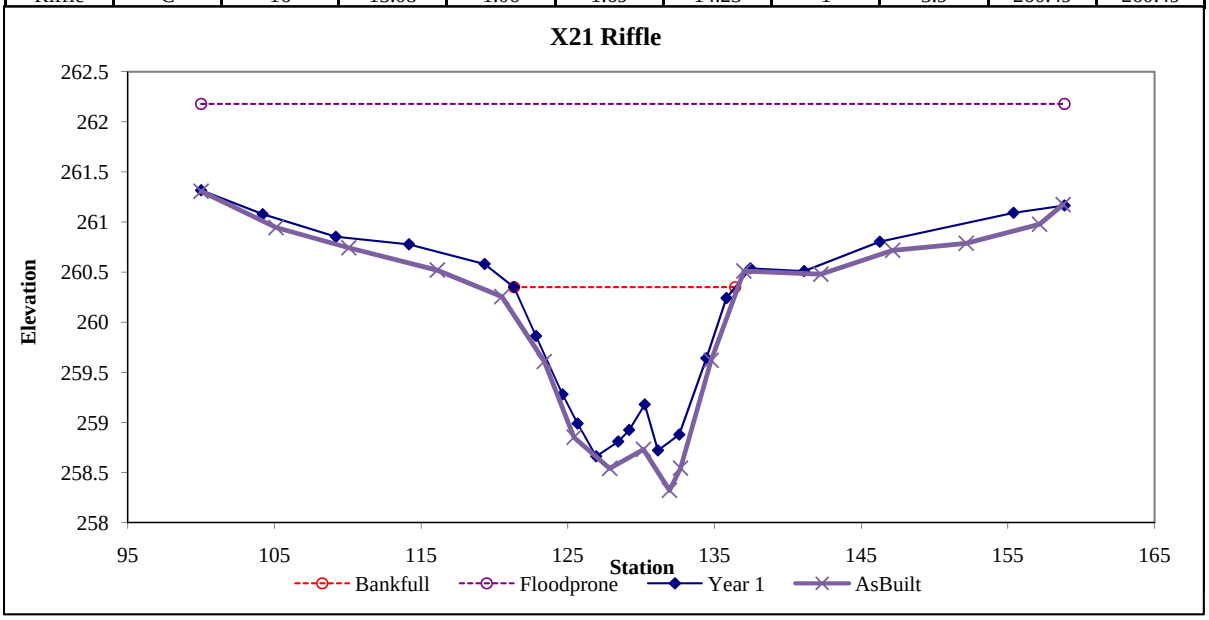
Permanent Cross Section X21
(Year 1 Monitoring Data - collected October 2009)



Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	16	15.08	1.06	1.69	14.23	1	3.9	260.49	260.49

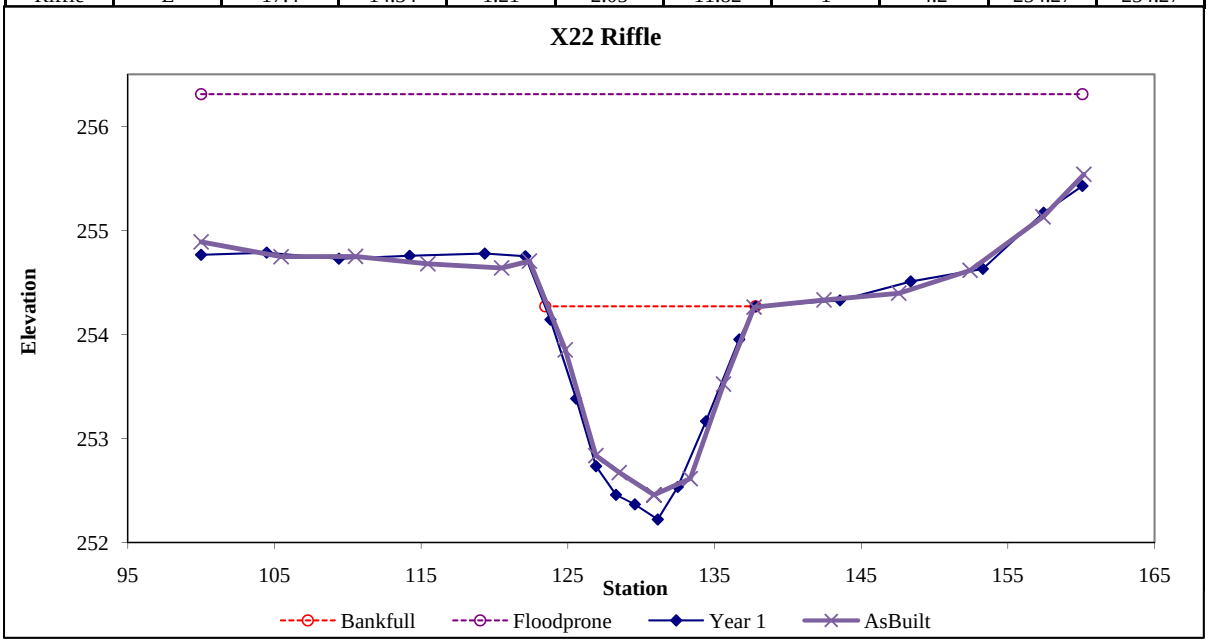


Permanent Cross Section X22
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	E	17.4	14.34	1.21	2.05	11.82	1	4.2	254.27	254.27

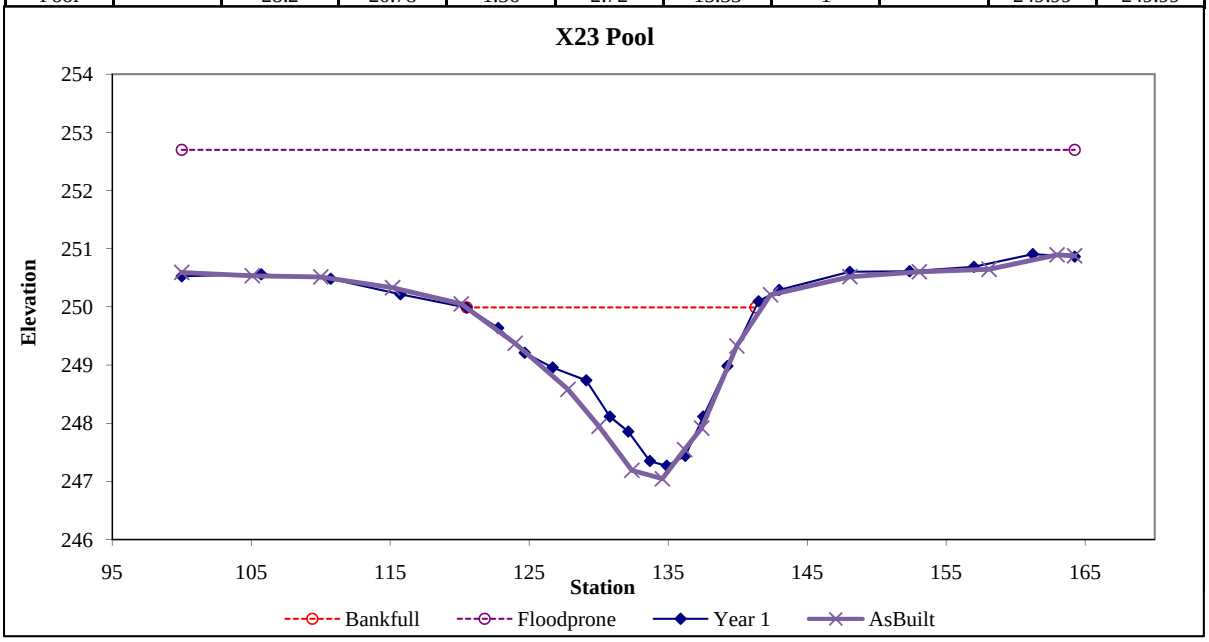


Permanent Cross Section X23
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		28.2	20.78	1.36	2.72	15.33	1		249.99	249.99

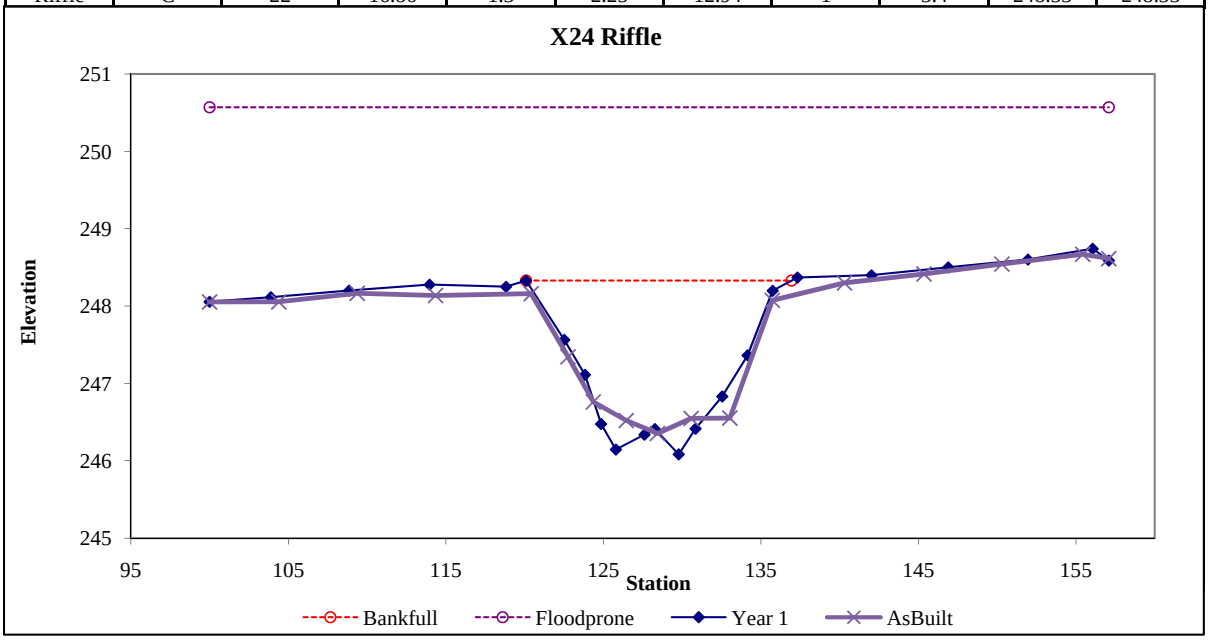


Permanent Cross Section X24
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	22	16.86	1.3	2.25	12.94	1	3.4	248.33	248.33

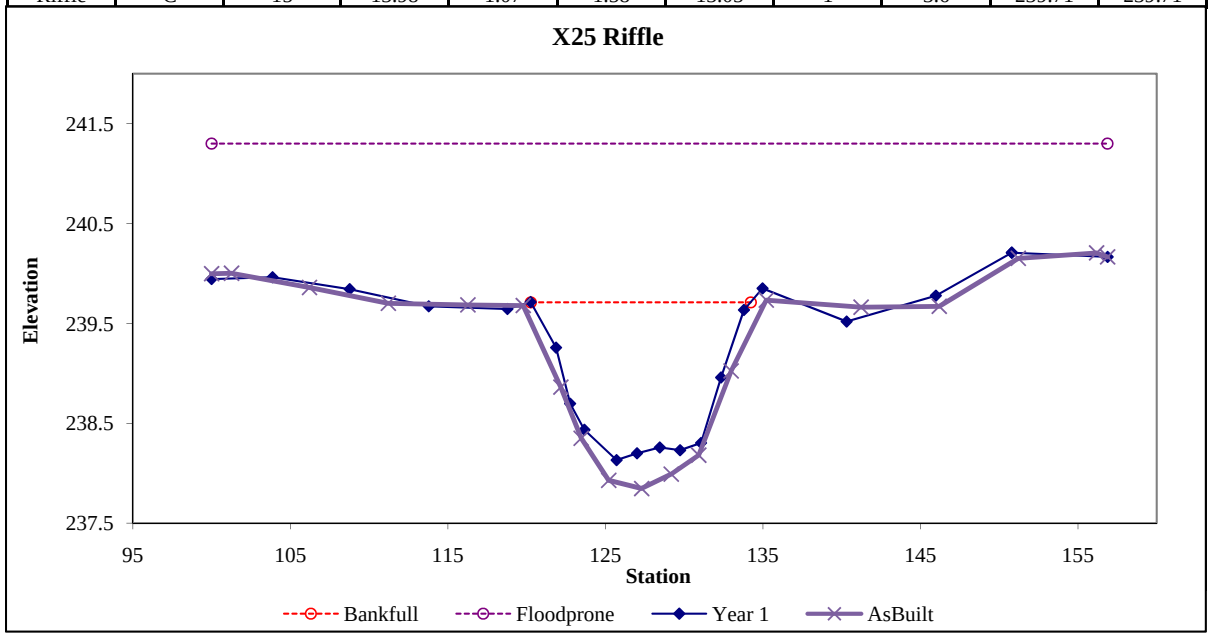


Permanent Cross Section X25
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	15	13.98	1.07	1.58	13.05	1	3.6	239.71	239.71

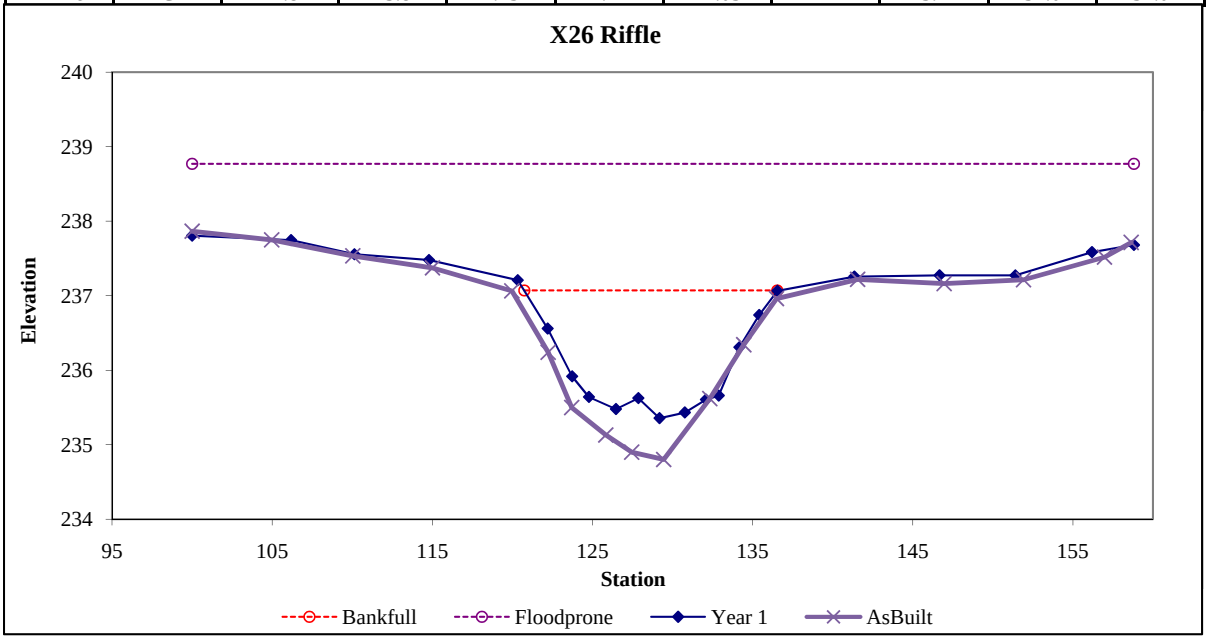


Permanent Cross Section X26
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	17.8	15.8	1.13	1.71	14.03	1	3.7	237.07	237.07

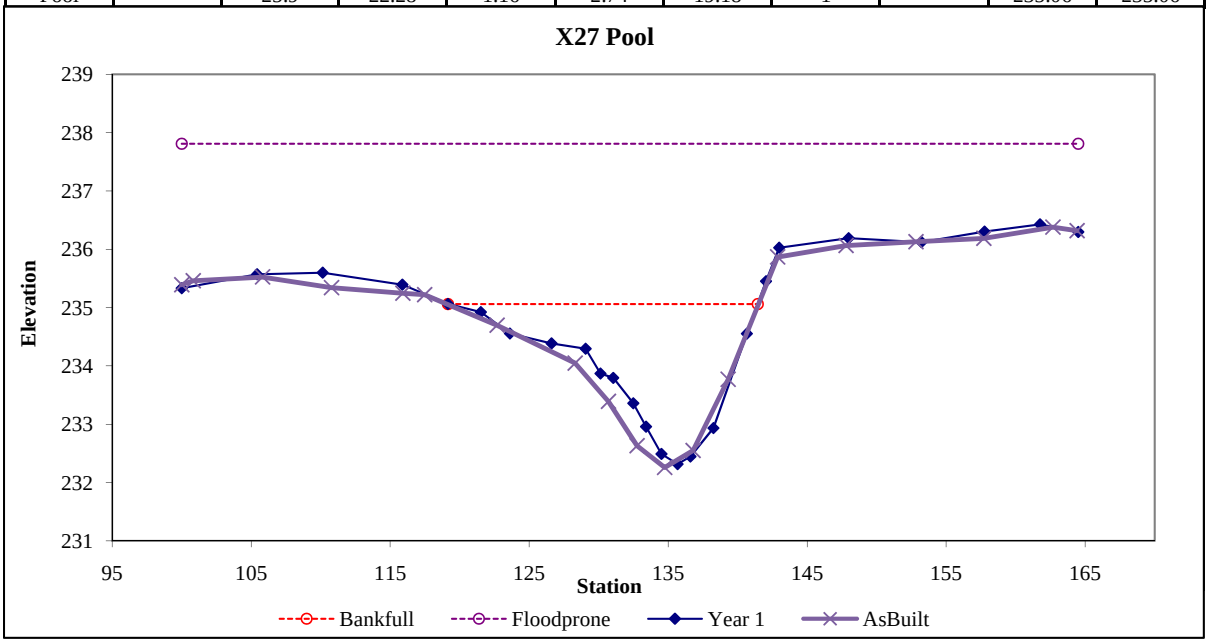


Permanent Cross Section X27
(Year 1 Monitoring Data - collected October 2009)

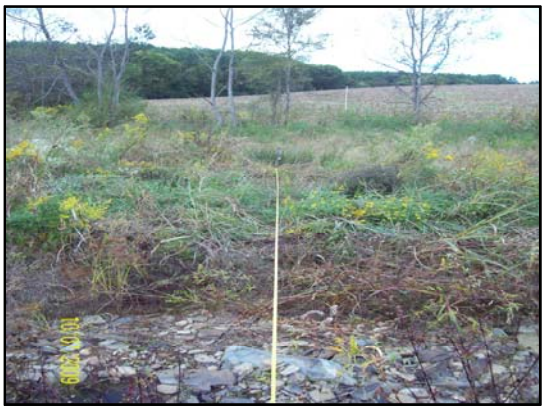
Looking at the Left Bank

Looking at the Right Bank

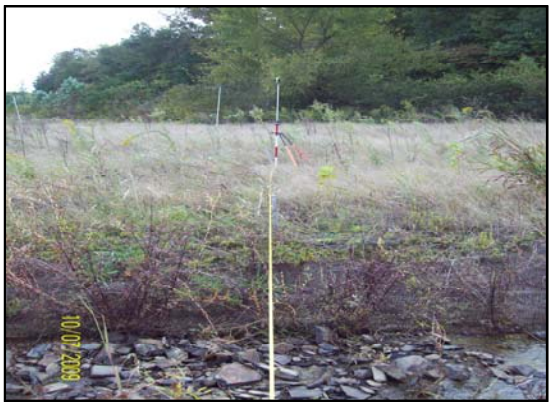
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		25.9	22.28	1.16	2.74	19.18	1		235.06	235.06



Permanent Cross Section X28
(Year 1 Monitoring Data - collected October 2009)

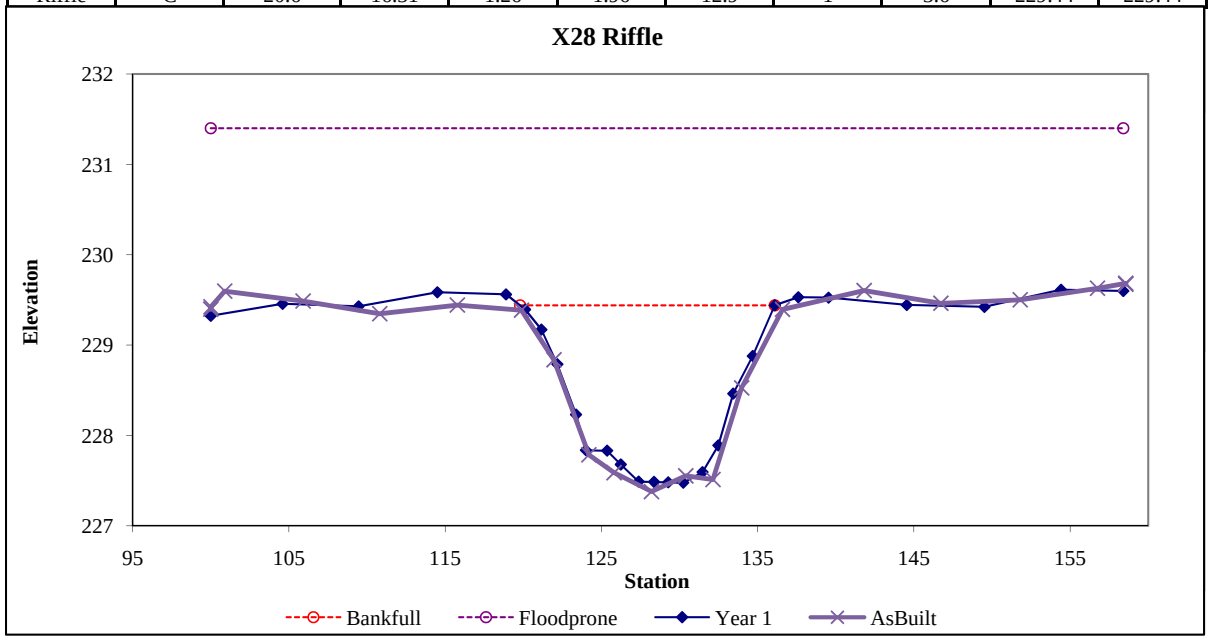


Looking at the Left Bank



Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	20.6	16.31	1.26	1.96	12.9	1	3.6	229.44	229.44

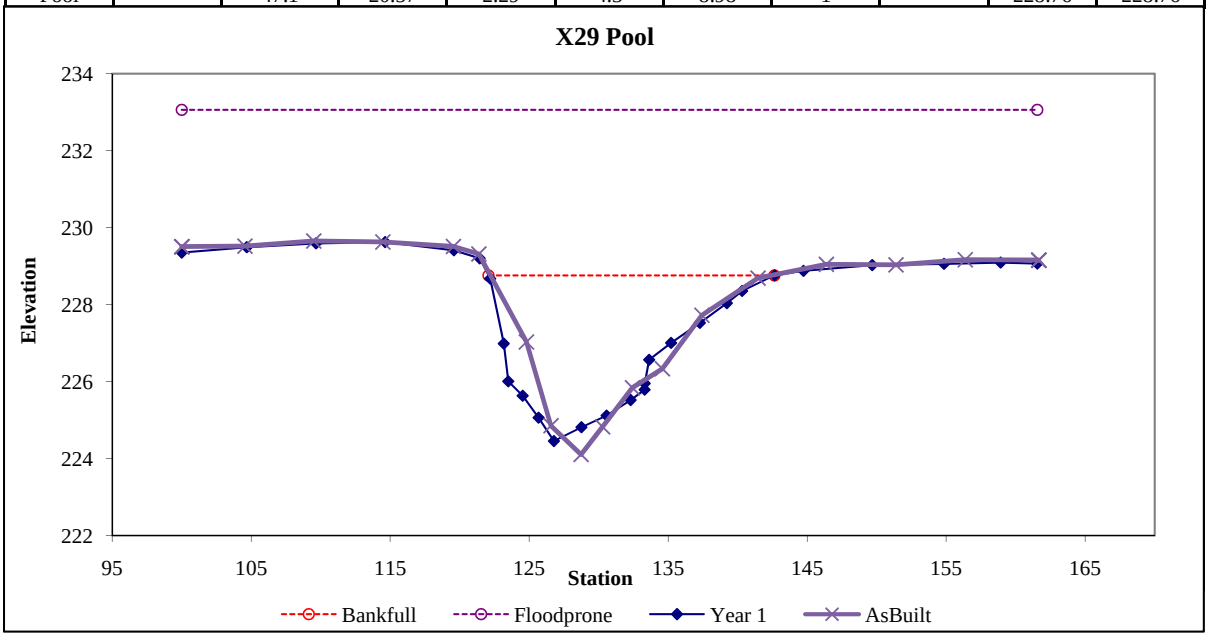


Permanent Cross Section X29
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		47.1	20.57	2.29	4.3	8.98	1		228.76	228.76

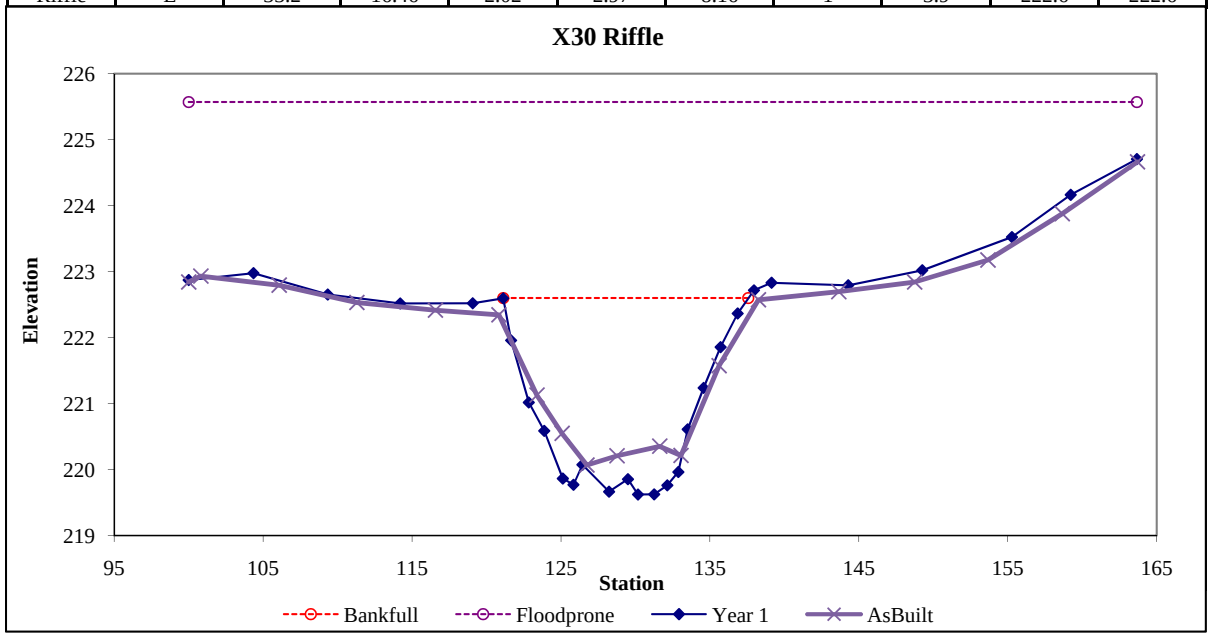


Permanent Cross Section X30
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	E	33.2	16.46	2.02	2.97	8.16	1	3.9	222.6	222.6

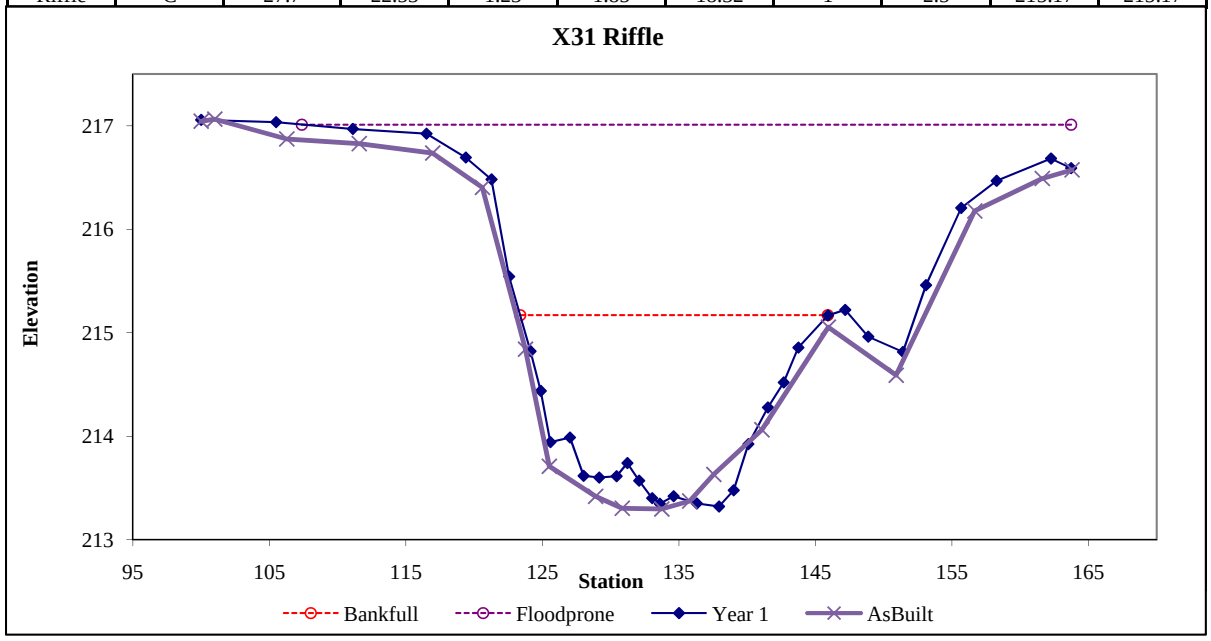


Permanent Cross Section X31
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C	27.7	22.53	1.23	1.85	18.32	1	2.5	215.17	215.17

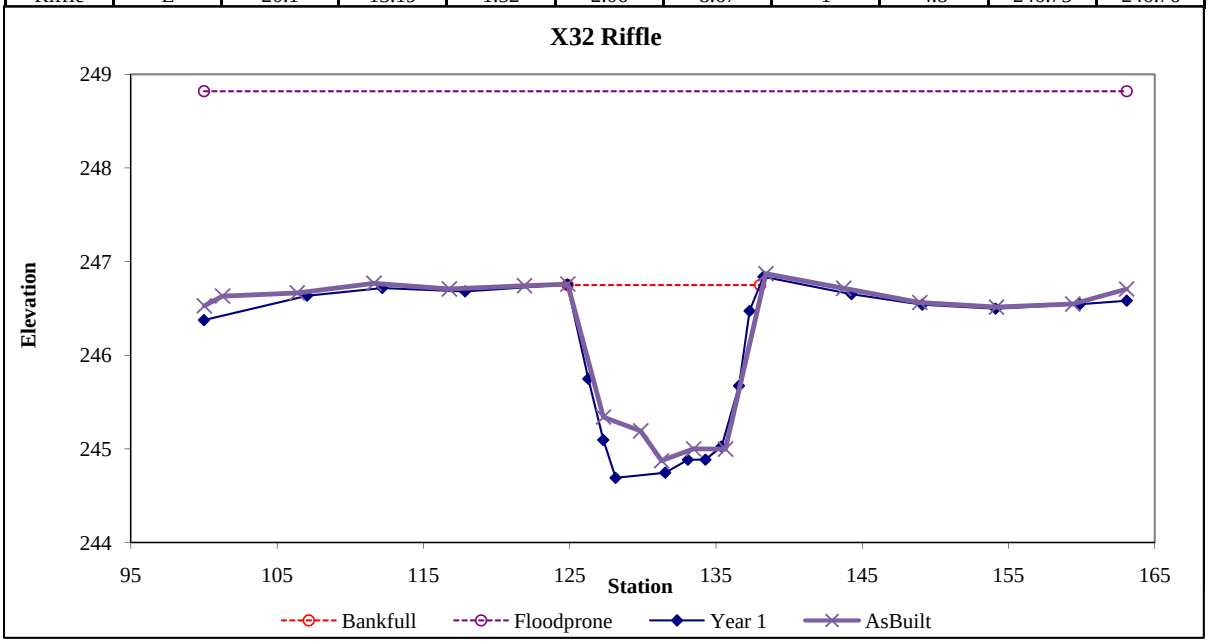


Permanent Cross Section X32
(Year 1 Monitoring Data - collected October 2009)

Looking at the Left Bank

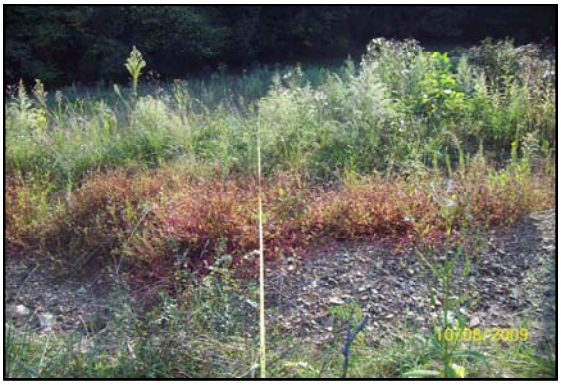
Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	E	20.1	13.19	1.52	2.06	8.67	1	4.8	246.75	246.76



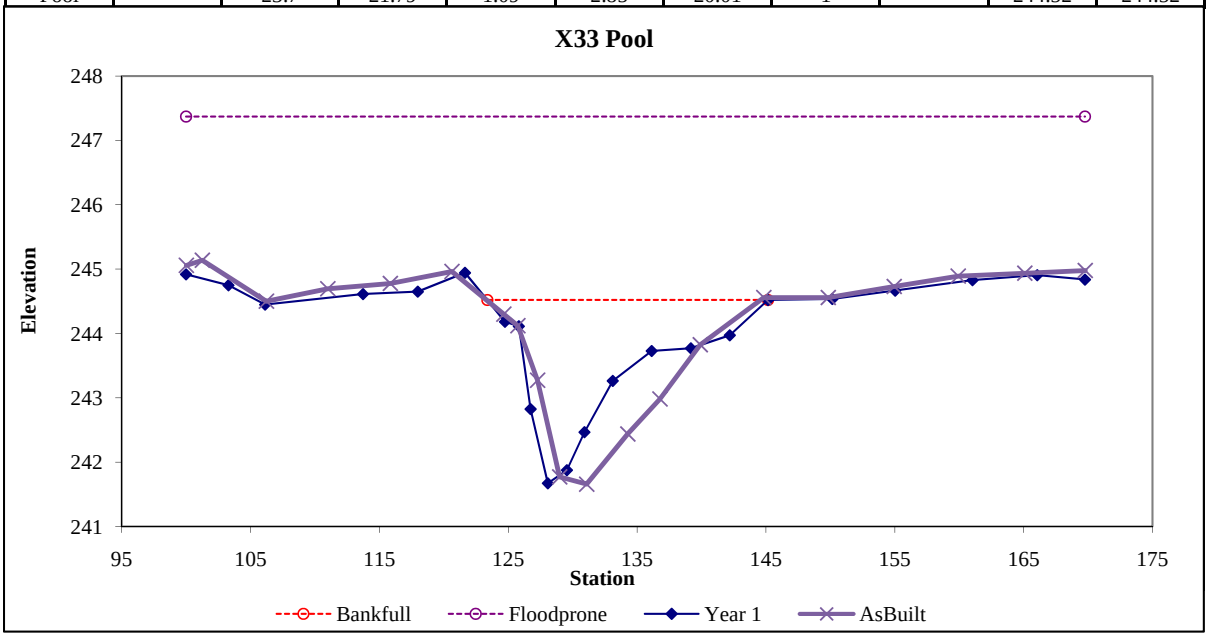
Permanent Cross Section X33
(Year 1 Monitoring Data - collected October 2009)

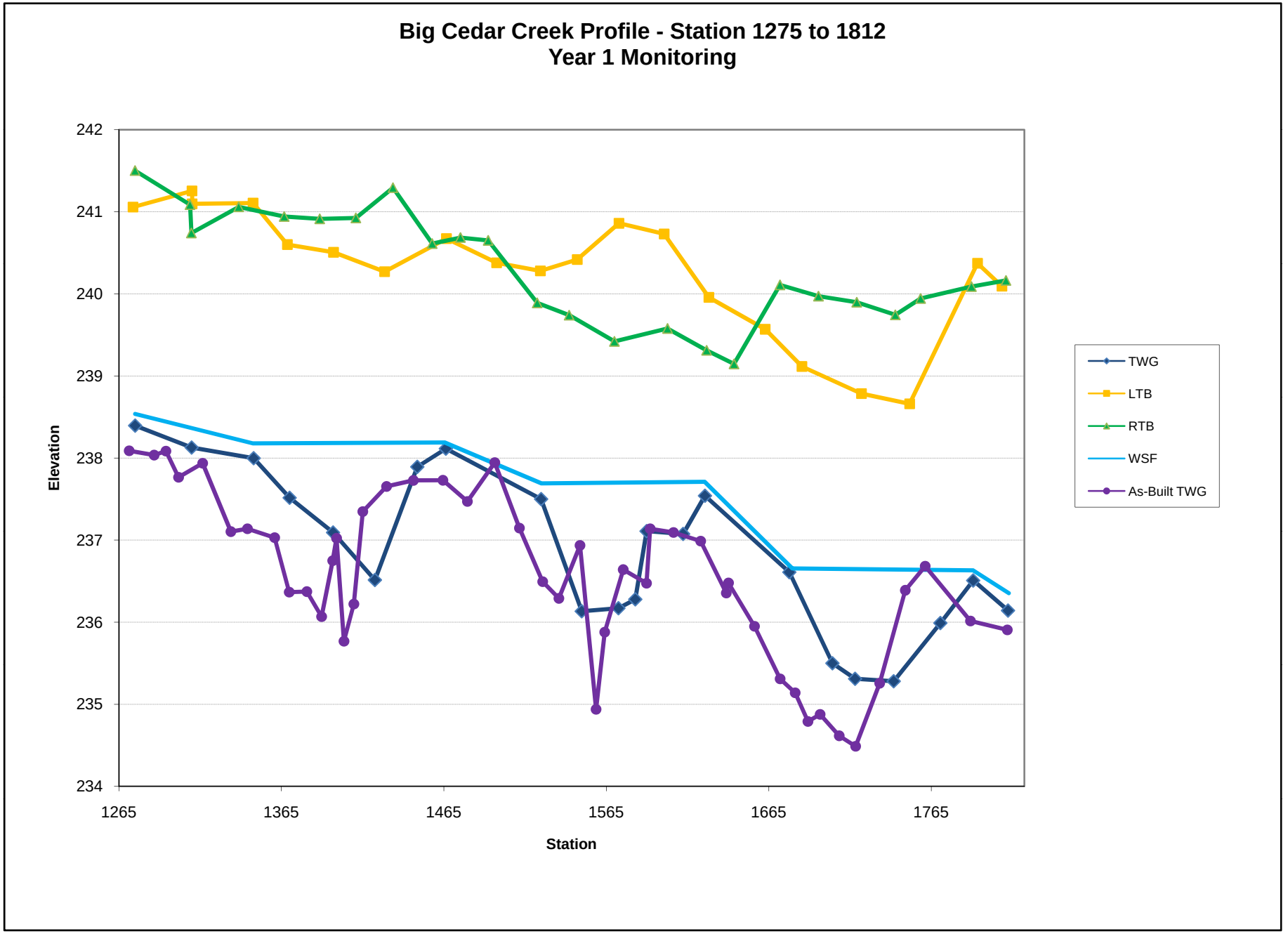
Looking at the Left Bank



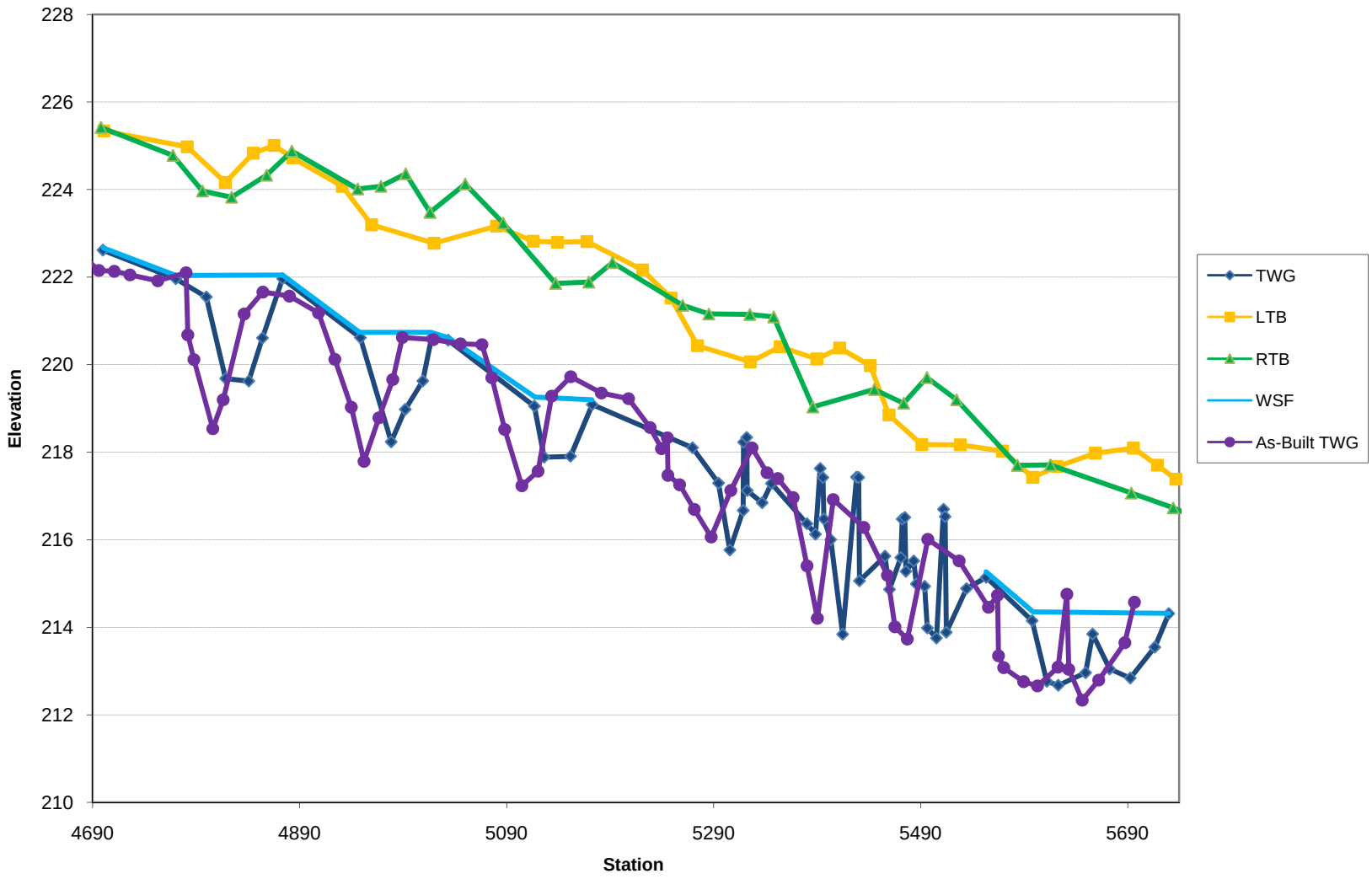
Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Pool		23.7	21.79	1.09	2.85	20.01	1		244.52	244.52

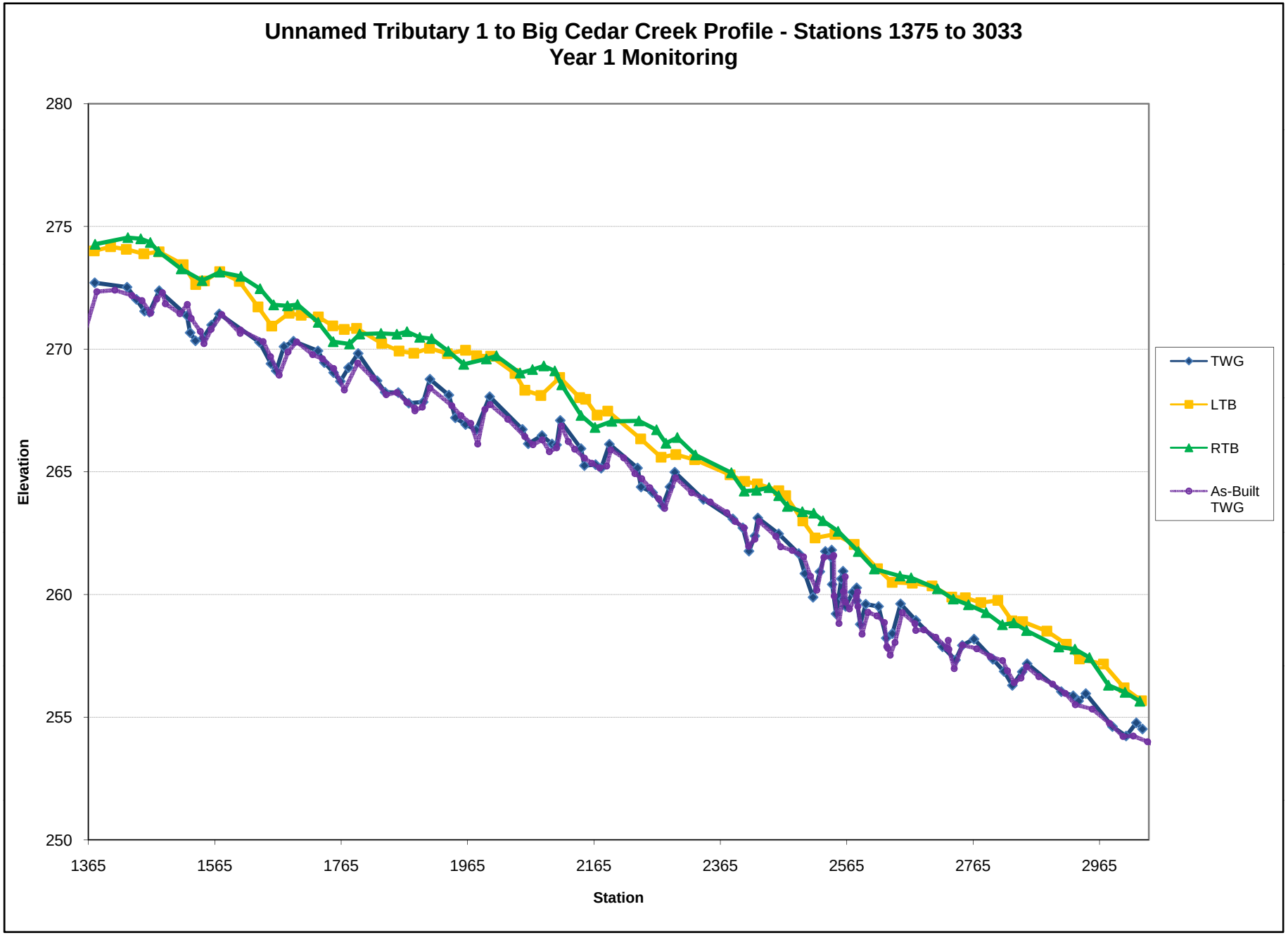



Big Cedar Creek Profile - Station 1275 to 1812
Year 1 Monitoring
Elevation
242
241
240
239
238
237
236
235
234
1265
1365
1465
1565
1665
1765
Station
TWG
LTB
RTB
WSF
As-Built TWG

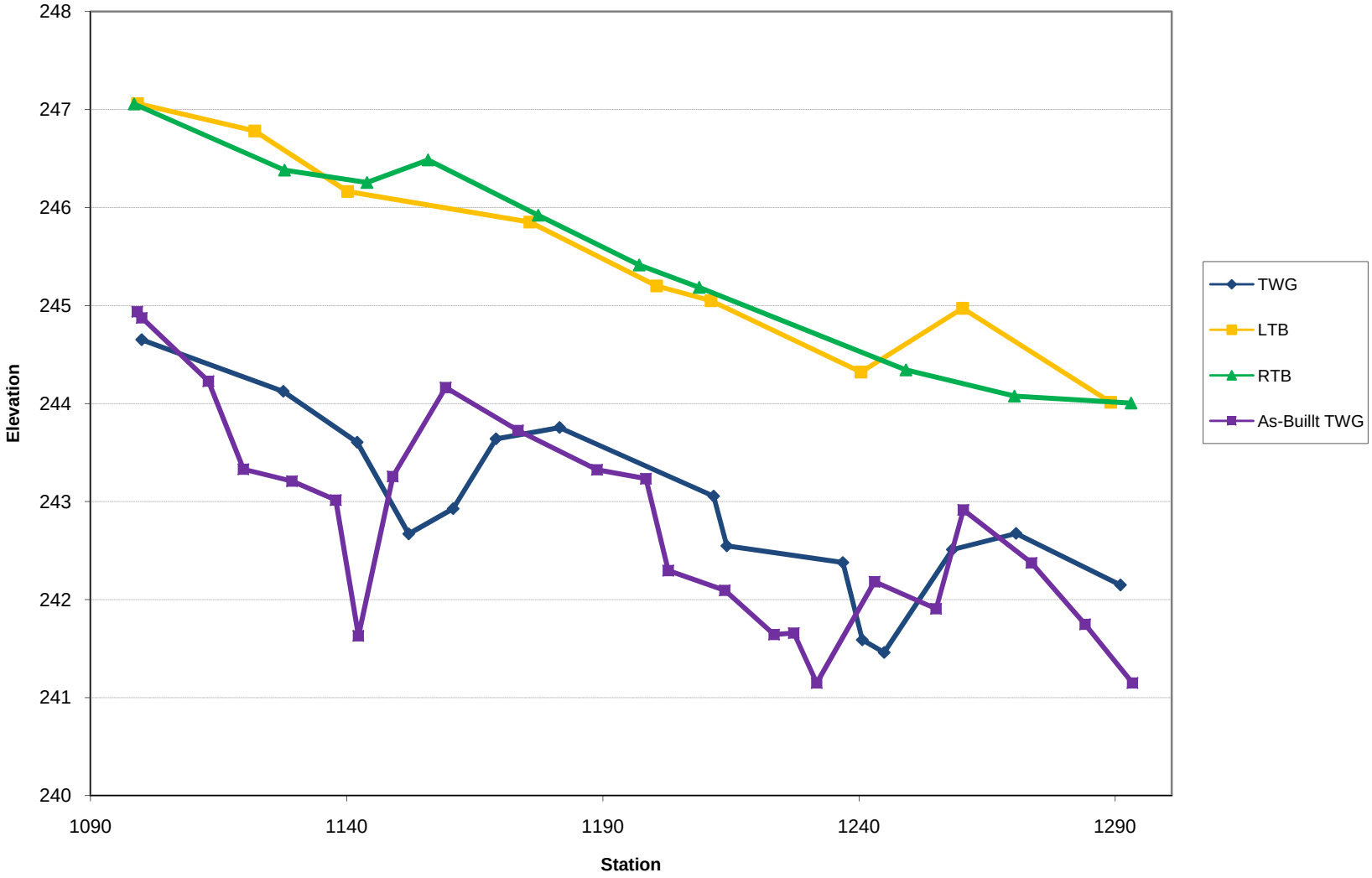
Big Cedar Creek Profile - Stations 4700 to 5730
Year 1 Monitoring



* Dry conditions at the time of data collection (Fall 2009) are reflected in a break in water surface from Station 51+72 to 55+53 Profile changes between Station 53+92 to 55+12 reflect the installation of four J-hook structures. These structures were installed to improve channel stability.


Unnamed Tributary 1 to Big Cedar Creek Profile - Stations 1375 to 3033
Year 1 Monitoring
Elevation
280
275
270
265
260
255
250
1365
1565
1765
1965
2165
2365
2565
2765
2965
Station
TWG
LTB
RTB
As-Built TWG

Unnamed Tributary 2 to Big Cedar Creek Profile - Stations 1100 to 1291
Year 1 Monitoring



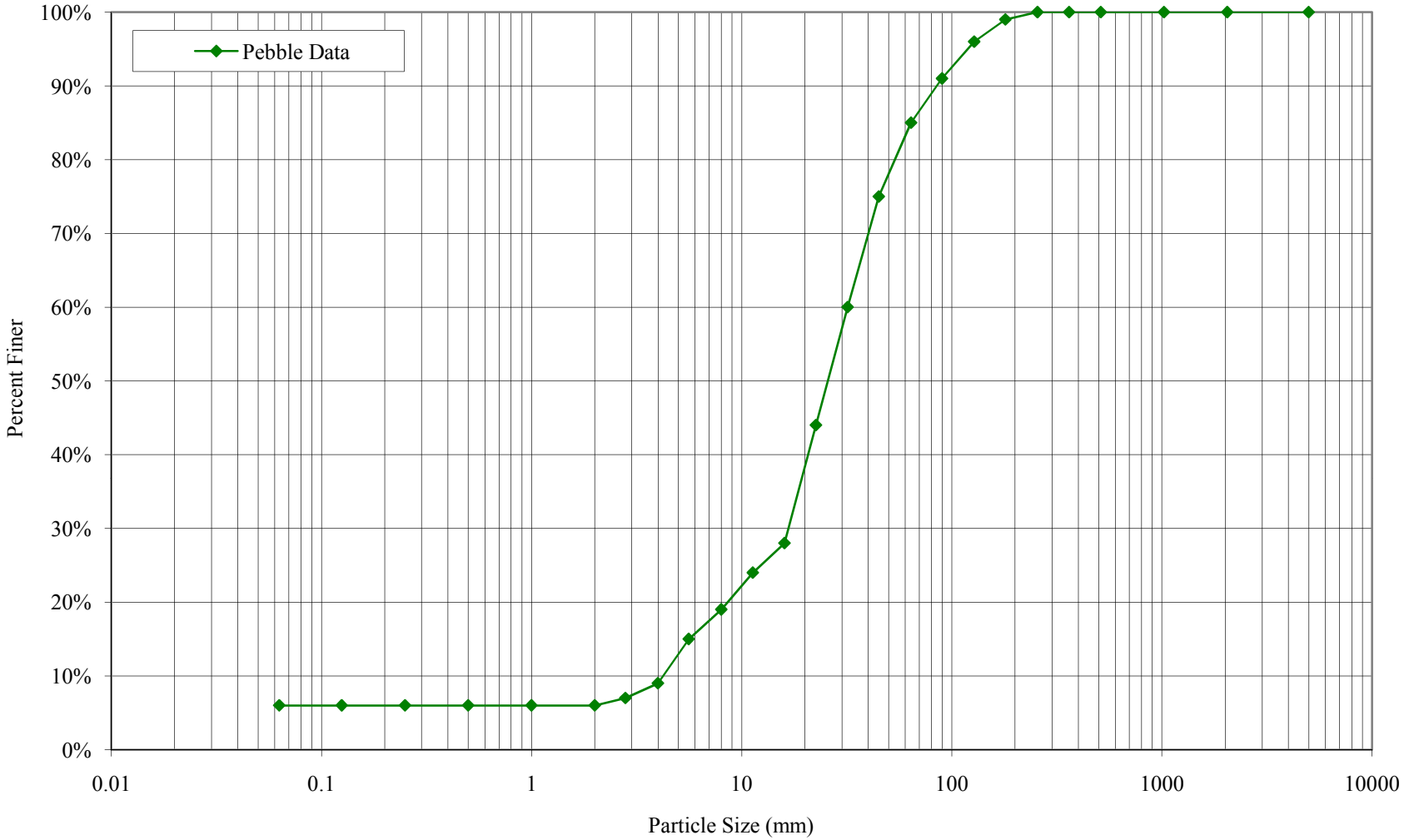
PEBBLE COUNT DATA SHEET: RIFFLE 100-COUNT

BAKER PROJECT NO.	109261
SITE OR PROJECT:	Big Cedar Creek Restoration - Year 1 Monitoring
REACH/LOCATION:	BCC X1 Riffle
DATE COLLECTED:	10/13/2009
FIELD COLLECTION BY:	IE/CM
DATA ENTRY BY:	IE

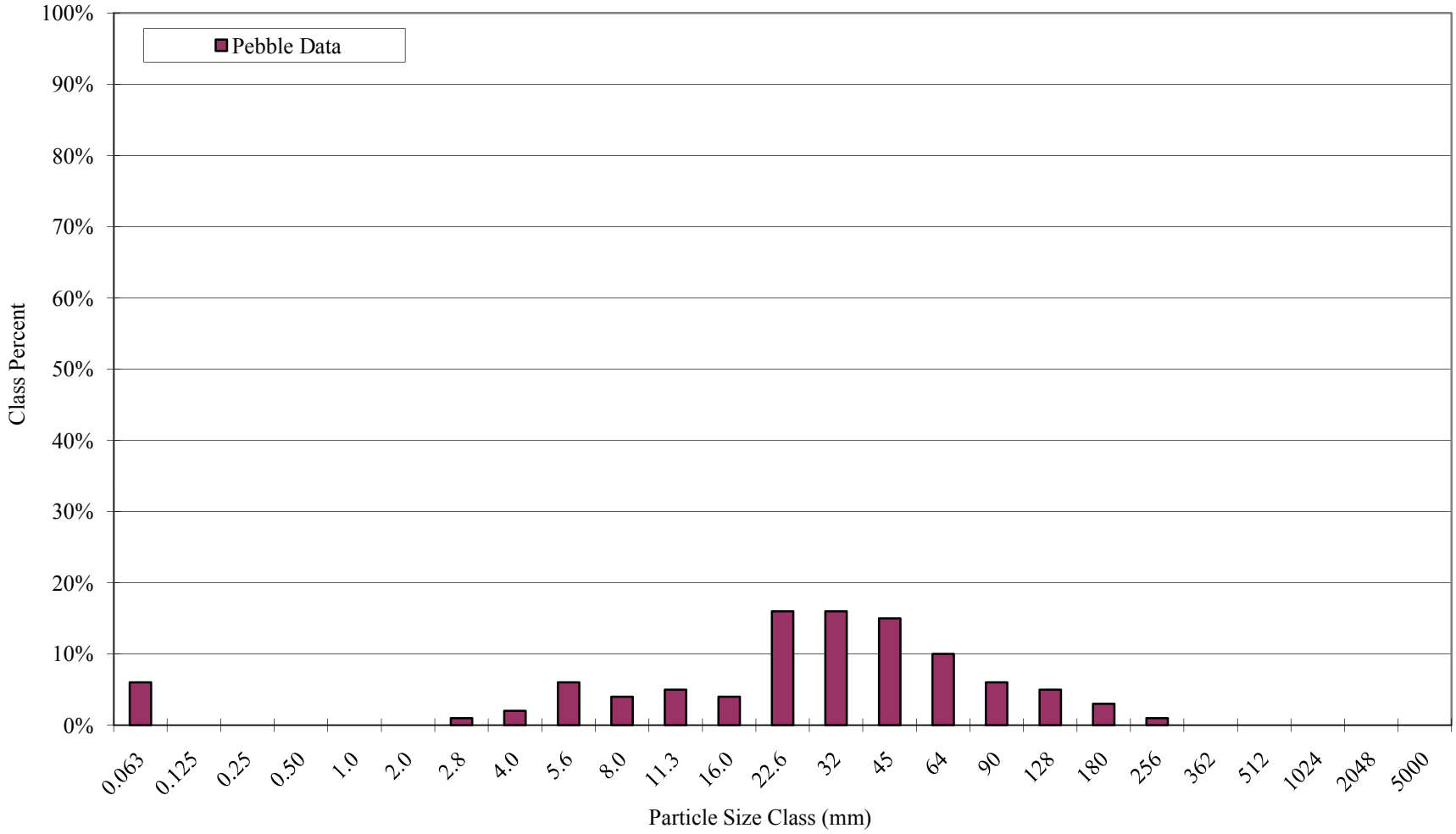
			PARTICLE CLASS COUNT	Summary	
MATERIAL	**PARTICLE**	**SIZE (mm)**	**Riffle**	**Class %**	**% Cum**
SILT/CLAY	Silt / Clay	< .063	6	6%	6%
SAN	Very Fine	.063 - .125			6%
	Fine	.125 - .25			6%
	Medium	.25 - .50			6%
	Coarse	.50 - 1.0			6%
	Very Coarse	1.0 - 2.0			6%
GRAVEL	Very Fine	2.0 - 2.8	1	1%	7%
	Very Fine	2.8 - 4.0	2	2%	9%
	Fine	4.0 - 5.6	6	6%	15%
	Fine	5.6 - 8.0	4	4%	19%
	Medium	8.0 - 11.0	5	5%	24%
	Medium	11.0 - 16.0	4	4%	28%
	Coarse	16.0 - 22.6	16	16%	44%
	Coarse	22.6 - 32	16	16%	60%
	Very Coarse	32 - 45	15	15%	75%
	Very Coarse	45 - 64	10	10%	85%
COBBLE	Small	64 - 90	6	6%	91%
	Small	90 - 128	5	5%	96%
	Large	128 - 180	3	3%	99%
	Large	180 - 256	1	1%	100%
BOULDER	Small	256 - 362			100%
	Small	362 - 512			100%
	Medium	512 - 1024			100%
	Large-Very Large	1024 - 2048			100%
BEDROCK	Bedrock	> 2048			100%
		Total	**100**	**100%**	

Largest particles: 200.00
(riffle)

Big Cedar Creek
BCC X1 - Riffle
Pebble Count Particle Size Distribution



Big Cedar Creek
BCC X1 - Riffle
Riffle Pebble Count Size Class Distribution



PEBBLE COUNT DATA SHEET: POOL 100-COUNT

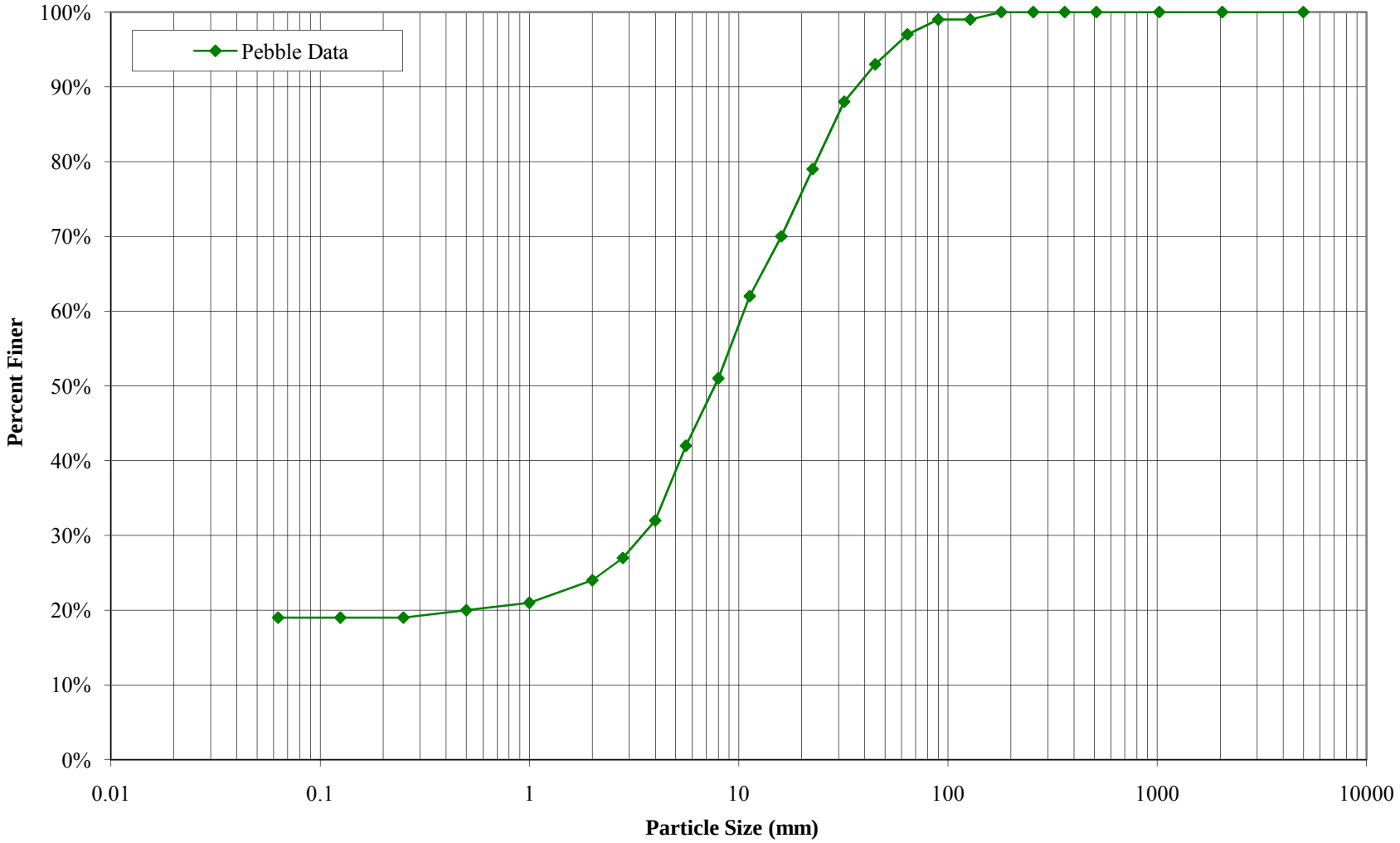
BAKER PROJECT NO.	109261
SITE OR PROJECT:	Big Cedar Creek Restoration - Year 1 Monitoring
REACH/LOCATION:	BCC X2 Pool
DATE COLLECTED:	10/13/2009
FIELD COLLECTION BY:	IE/CM
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary	
MATERIAL	PARTICLE	SIZE (mm)	Pool	Class %	% Cum
SILT/CLAY	Silt / Clay	< .063	19	19%	19%
SAND	Very Fine	.063 - .125			19%
	Fine	.125 - .25			19%
	Medium	.25 - .50	1	1%	20%
	Coarse	.50 - 1.0	1	1%	21%
	Very Coarse	1.0 - 2.0	3	3%	24%
GRAVEL	Very Fine	2.0 - 2.8	3	3%	27%
	Very Fine	2.8 - 4.0	5	5%	32%
	Fine	4.0 - 5.6	10	10%	42%
	Fine	5.6 - 8.0	9	9%	51%
	Medium	8.0 - 11.0	11	11%	62%
	Medium	11.0 - 16.0	8	8%	70%
	Coarse	16.0 - 22.6	9	9%	79%
	Coarse	22.6 - 32	9	9%	88%
	Very Coarse	32 - 45	5	5%	93%
	Very Coarse	45 - 64	4	4%	97%
COBBLE	Small	64 - 90	2	2%	99%
	Small	90 - 128			99%
	Large	128 - 180	1	1%	100%
	Large	180 - 256			100%
BOULDER	Small	256 - 362			100%
	Small	362 - 512			100%
	Medium	512 - 1024			100%
	Large-Very Large	1024 - 2048			100%
BEDROCK	Bedrock	> 2048			100%
		Total	**100**	**100%**	

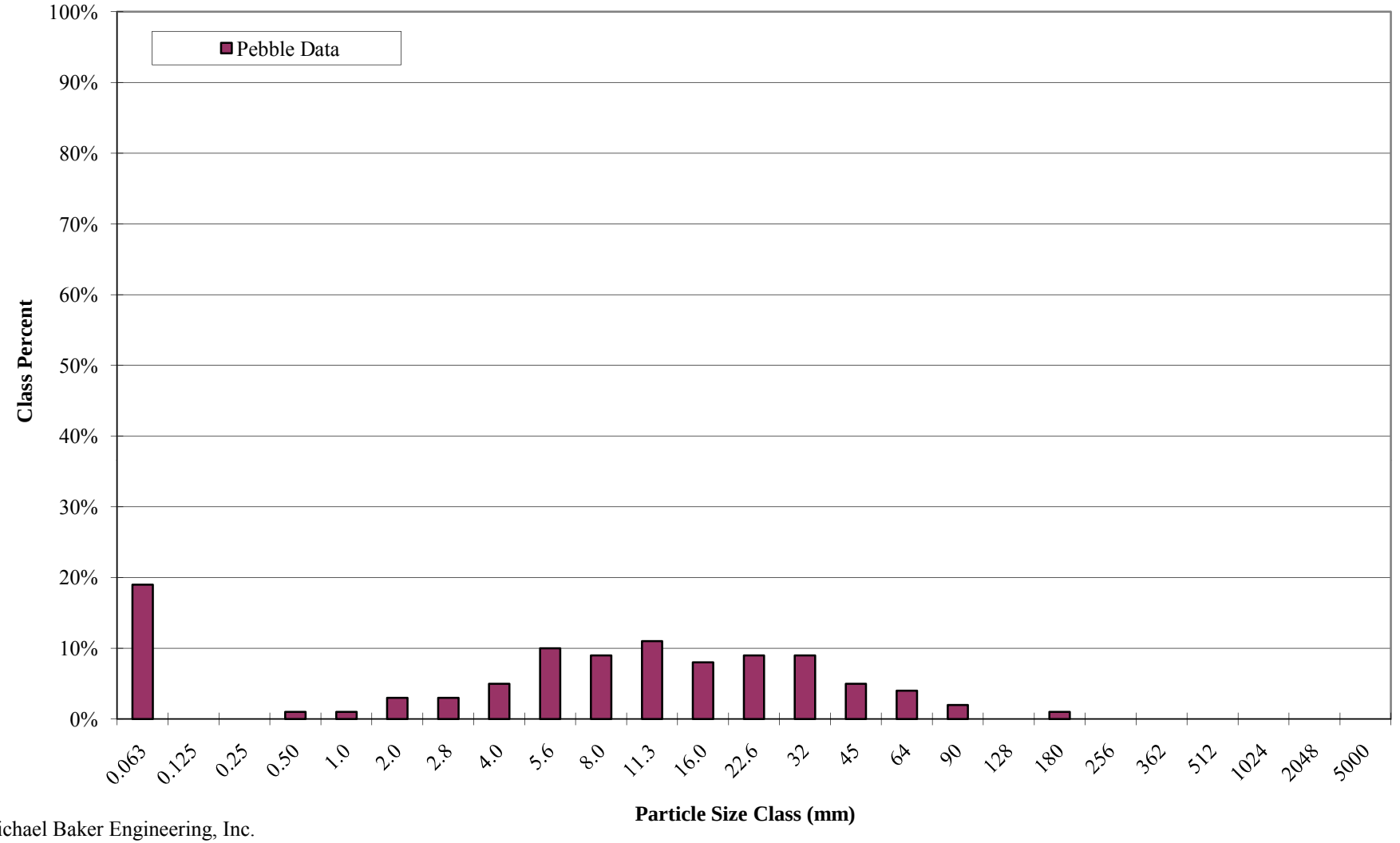
Largest particles: 180.00

(pool)

Big Cedar Creek
BCC X2 - Pool
Pebble Count Particle Size Distribution



Big Cedar Creek
BCC X2 - Pool
Pebble Count Size Class Distribution



PEBBLE COUNT DATA SHEET: POOL 100-COUNT

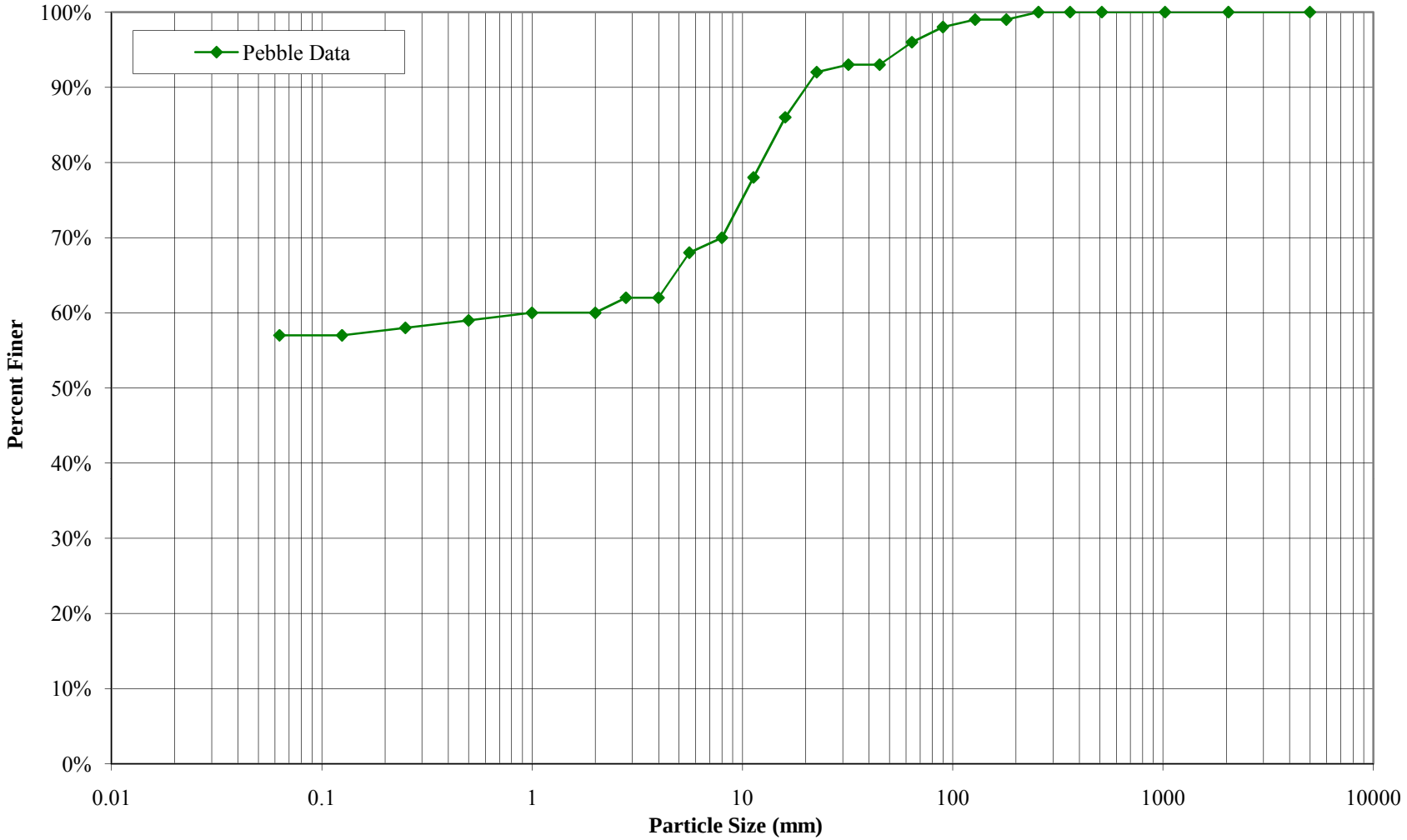
BAKER PROJECT NO.	109261
SITE OR PROJECT:	Big Cedar Creek Restoration - Year 1 Monitoring
REACH/LOCATION:	BCC X4 Pool
DATE COLLECTED:	10/13/2009
FIELD COLLECTION BY:	IE/CM
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary	
MATERIAL	**PARTICLE**	**SIZE (mm)**	**Pool**	**Class %**	**% Cum**
SILT/CLAY	Silt / Clay	< .063	57	57%	57%
SAND	Very Fine	.063 - .125			57%
	Fine	.125 - .25	1	1%	58%
	Medium	.25 - .50	1	1%	59%
	Coarse	.50 - 1.0	1	1%	60%
	Very Coarse	1.0 - 2.0			60%
GRAVEL	Very Fine	2.0 - 2.8	2	2%	62%
	Very Fine	2.8 - 4.0			62%
	Fine	4.0 - 5.6	6	6%	68%
	Fine	5.6 - 8.0	2	2%	70%
	Medium	8.0 - 11.0	8	8%	78%
	Medium	11.0 - 16.0	8	8%	86%
	Coarse	16.0 - 22.6	6	6%	92%
	Coarse	22.6 - 32	1	1%	93%
	Very Coarse	32 - 45			93%
	Very Coarse	45 - 64	3	3%	96%
COBBLE	Small	64 - 90	2	2%	98%
	Small	90 - 128	1	1%	99%
	Large	128 - 180			99%
	Large	180 - 256	1	1%	100%
BOULDER	Small	256 - 362			100%
	Small	362 - 512			100%
	Medium	512 - 1024			100%
	Large-Very Large	1024 - 2048			100%
BEDROCK	Bedrock	> 2048			100%
		Total	**100**	**100%**	

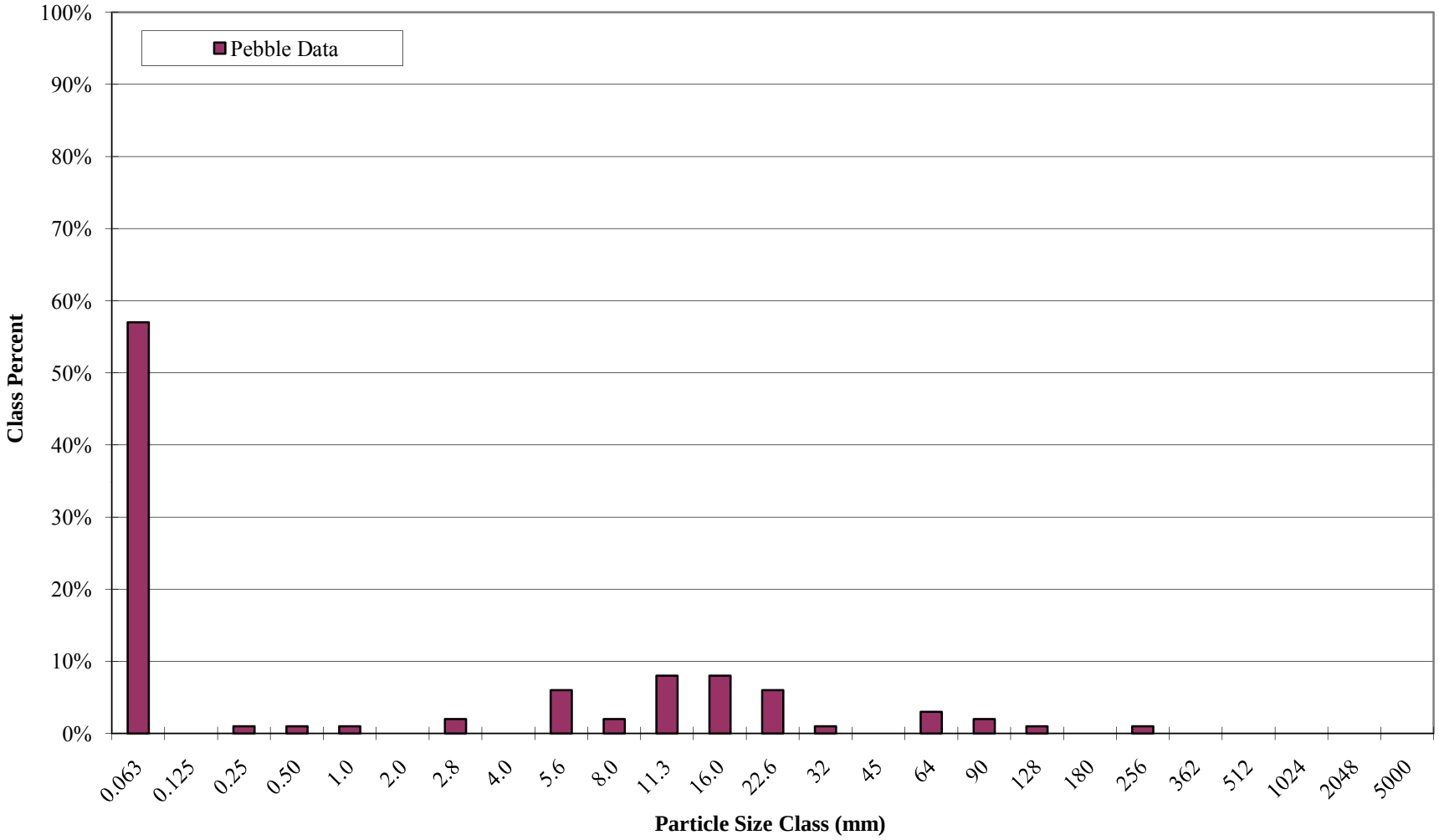
Largest particles: 210.00

(pool)

Big Cedar Creek
BCC X4 - Pool
Pebble Count Particle Size Distribution



Big Cedar Creek
BCC X4 - Pool
Pebble Count Size Class Distribution



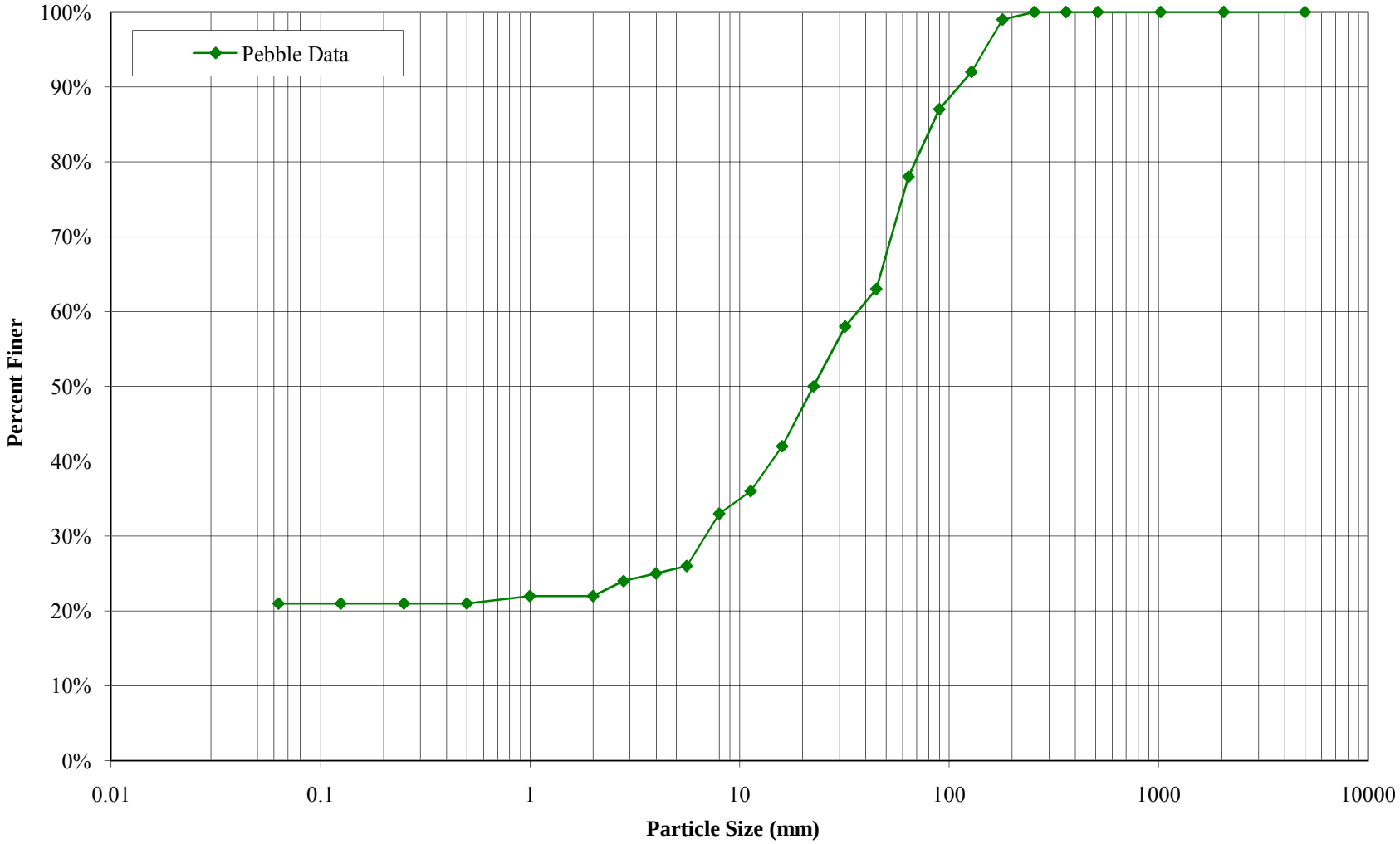
PEBBLE COUNT DATA SHEET: RIFFLE 100-COUNT

BAKER PROJECT NO.	109261
SITE OR PROJECT:	Big Cedar Creek Restoration - Year 1 Monitoring
REACH/LOCATION:	BCC X5 Riffle
DATE COLLECTED:	10/13/2009
FIELD COLLECTION BY:	IE/CM
DATA ENTRY BY:	IE

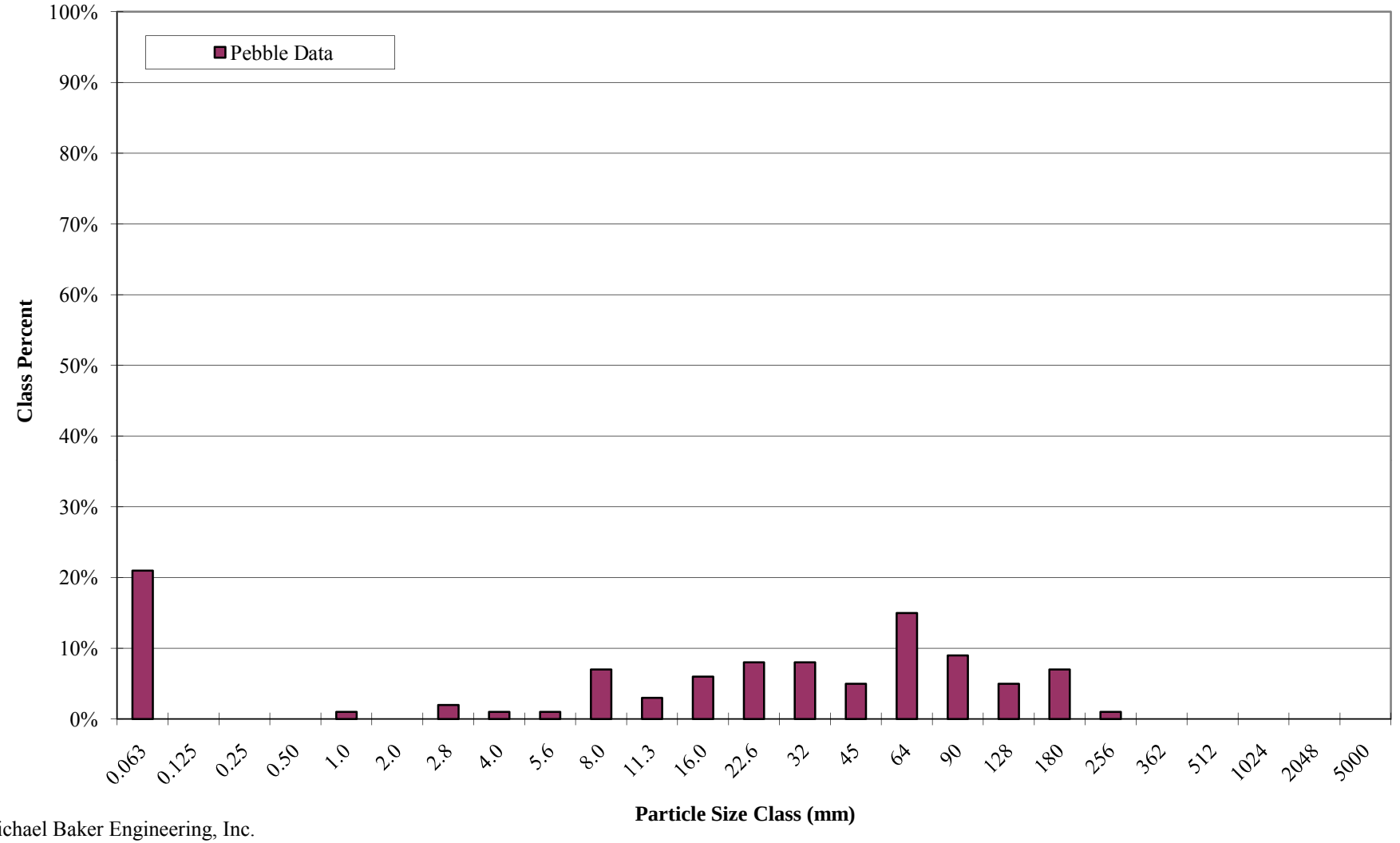
			PARTICLE CLASS COUNT	Summary	
MATERIAL	**PARTICLE**	**SIZE (mm)**	**Riffle**	**Class %**	**% Cum**
SILT/CLAY	Silt / Clay	< .063	21	21%	21%
SAND	Very Fine	.063 - .125			21%
	Fine	.125 - .25			21%
	Medium	.25 - .50			21%
	Coarse	.50 - 1.0	1	1%	22%
	Very Coarse	1.0 - 2.0			22%
GRAVEL	Very Fine	2.0 - 2.8	2	2%	24%
	Very Fine	2.8 - 4.0	1	1%	25%
	Fine	4.0 - 5.6	1	1%	26%
	Fine	5.6 - 8.0	7	7%	33%
	Medium	8.0 - 11.0	3	3%	36%
	Medium	11.0 - 16.0	6	6%	42%
	Coarse	16.0 - 22.6	8	8%	50%
	Coarse	22.6 - 32	8	8%	58%
	Very Coarse	32 - 45	5	5%	63%
	Very Coarse	45 - 64	15	15%	78%
COBBLE	Small	64 - 90	9	9%	87%
	Small	90 - 128	5	5%	92%
	Large	128 - 180	7	7%	99%
	Large	180 - 256	1	1%	100%
BOULDER	Small	256 - 362			100%
	Small	362 - 512			100%
	Medium	512 - 1024			100%
	Large-Very Large	1024 - 2048			100%
BEDROCK	Bedrock	> 2048			100%
		Total	**100**	**100%**	

Largest particles: 190.00
(riffle)

Big Cedar Creek
BCC X5 - Riffle
Pebble Count Particle Size Distribution



Big Cedar Creek
BCC X5 - Riffle
Pebble Count Size Class Distribution



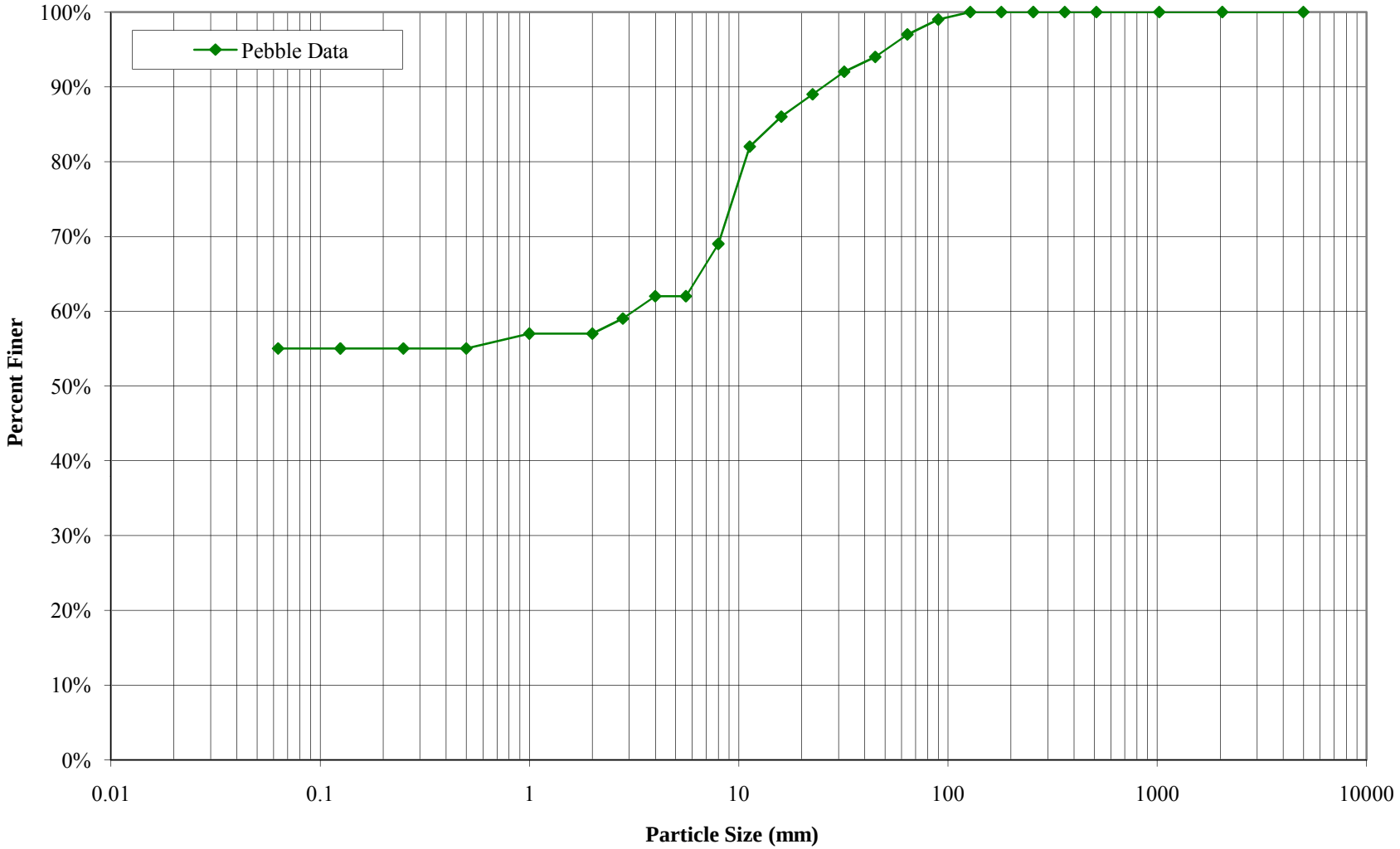
PEBBLE COUNT DATA SHEET: POOL 100-COUNT

BAKER PROJECT NO.	109261
SITE OR PROJECT:	Big Cedar Creek Restoration - Year 1 Monitoring
REACH/LOCATION:	BCC X8 Pool
DATE COLLECTED:	10/13/2009
FIELD COLLECTION BY:	IE/CM
DATA ENTRY BY:	IE

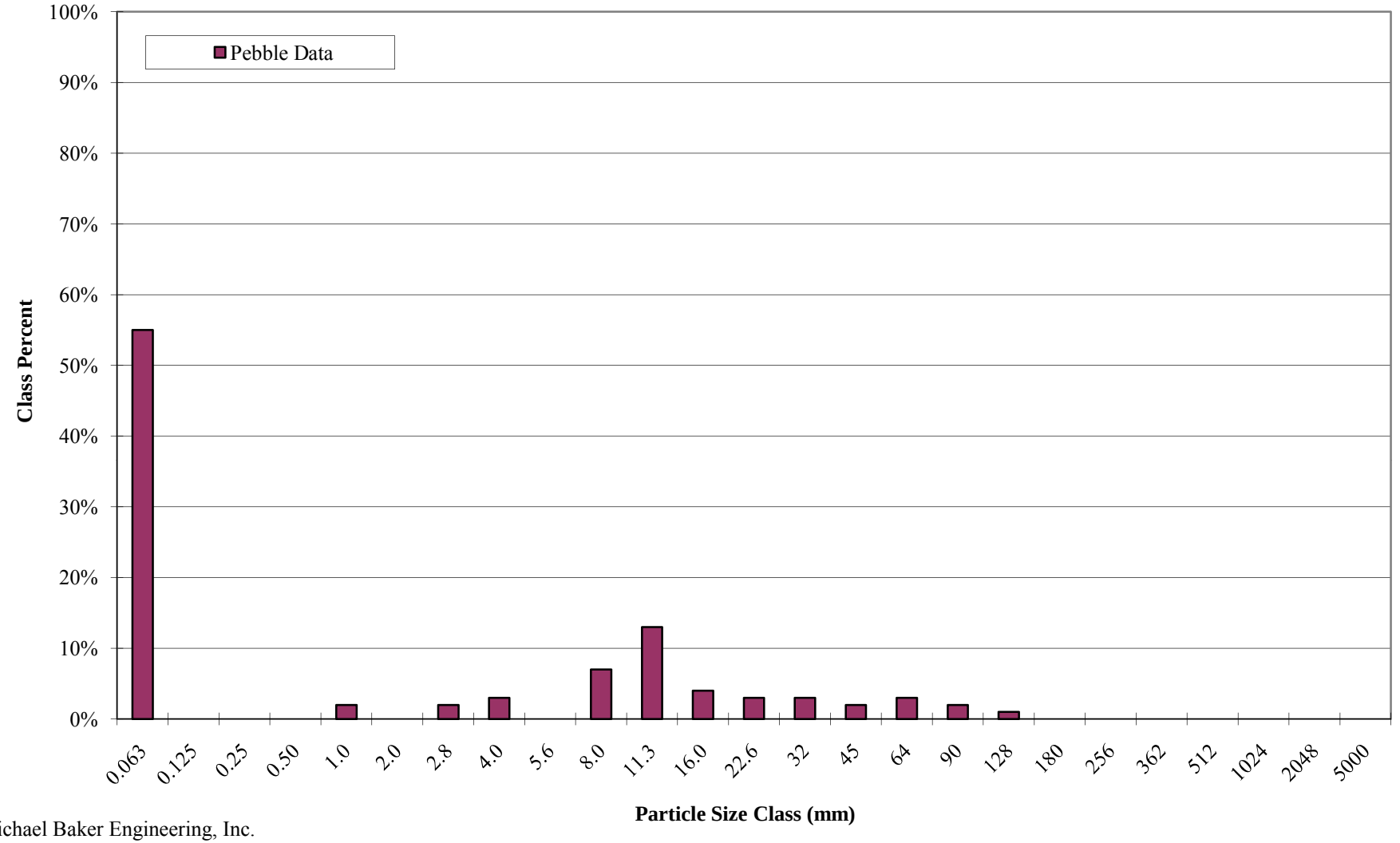
			PARTICLE CLASS COUNT	Summary	
MATERIAL	PARTICLE	SIZE (mm)	Pool	Class %	% Cum
SILT/CLAY	Silt / Clay	< .063	55	55%	55%
SAND	Very Fine	.063 - .125			55%
	Fine	.125 - .25			55%
	Medium	.25 - .50			55%
	Coarse	.50 - 1.0	2	2%	57%
	Very Coarse	1.0 - 2.0			57%
GRAVEL	Very Fine	2.0 - 2.8	2	2%	59%
	Very Fine	2.8 - 4.0	3	3%	62%
	Fine	4.0 - 5.6			62%
	Fine	5.6 - 8.0	7	7%	69%
	Medium	8.0 - 11.0	13	13%	82%
	Medium	11.0 - 16.0	4	4%	86%
	Coarse	16.0 - 22.6	3	3%	89%
	Coarse	22.6 - 32	3	3%	92%
	Very Coarse	32 - 45	2	2%	94%
	Very Coarse	45 - 64	3	3%	97%
COBBLE	Small	64 - 90	2	2%	99%
	Small	90 - 128	1	1%	100%
	Large	128 - 180			100%
	Large	180 - 256			100%
BOULDER	Small	256 - 362			100%
	Small	362 - 512			100%
	Medium	512 - 1024			100%
	Large-Very Large	1024 - 2048			100%
BEDROCK	Bedrock	> 2048			100%
		Total	**100**	**100%**	

Largest particles: 120.00
(pool)

Big Cedar Creek
BCC X8 - Pool
Pebble Count Particle Size Distribution



Big Cedar Creek
BCC X8 - Pool
Pebble Count Size Class Distribution



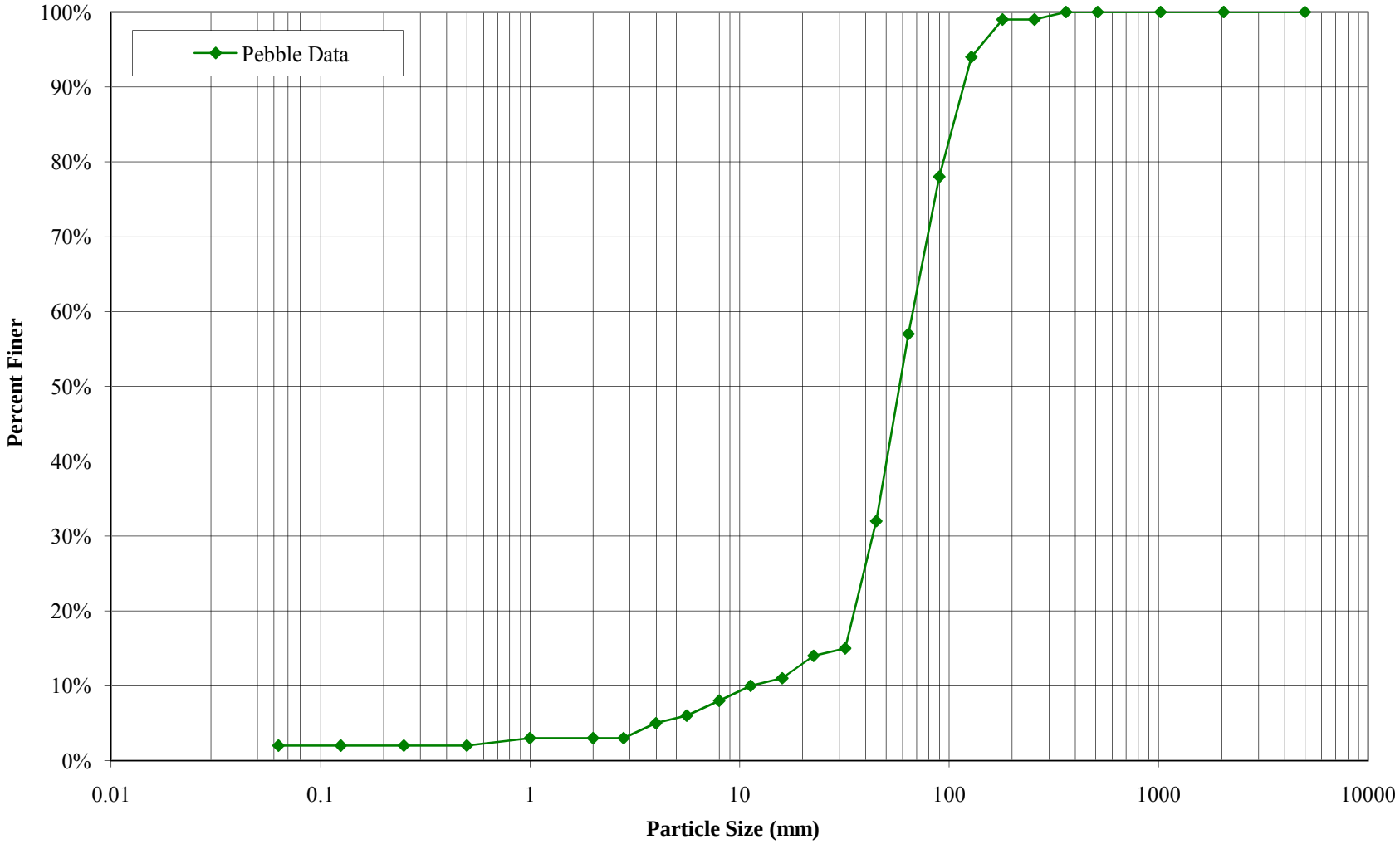
PEBBLE COUNT DATA SHEET: RIFFLE 100-COUNT

BAKER PROJECT NO.	109261
SITE OR PROJECT:	Big Cedar Creek Restoration - Year 1 Monitoring
REACH/LOCATION:	BCC X10 Riffle
DATE COLLECTED:	10/13/2009
FIELD COLLECTION BY:	IE/CM
DATA ENTRY BY:	IE

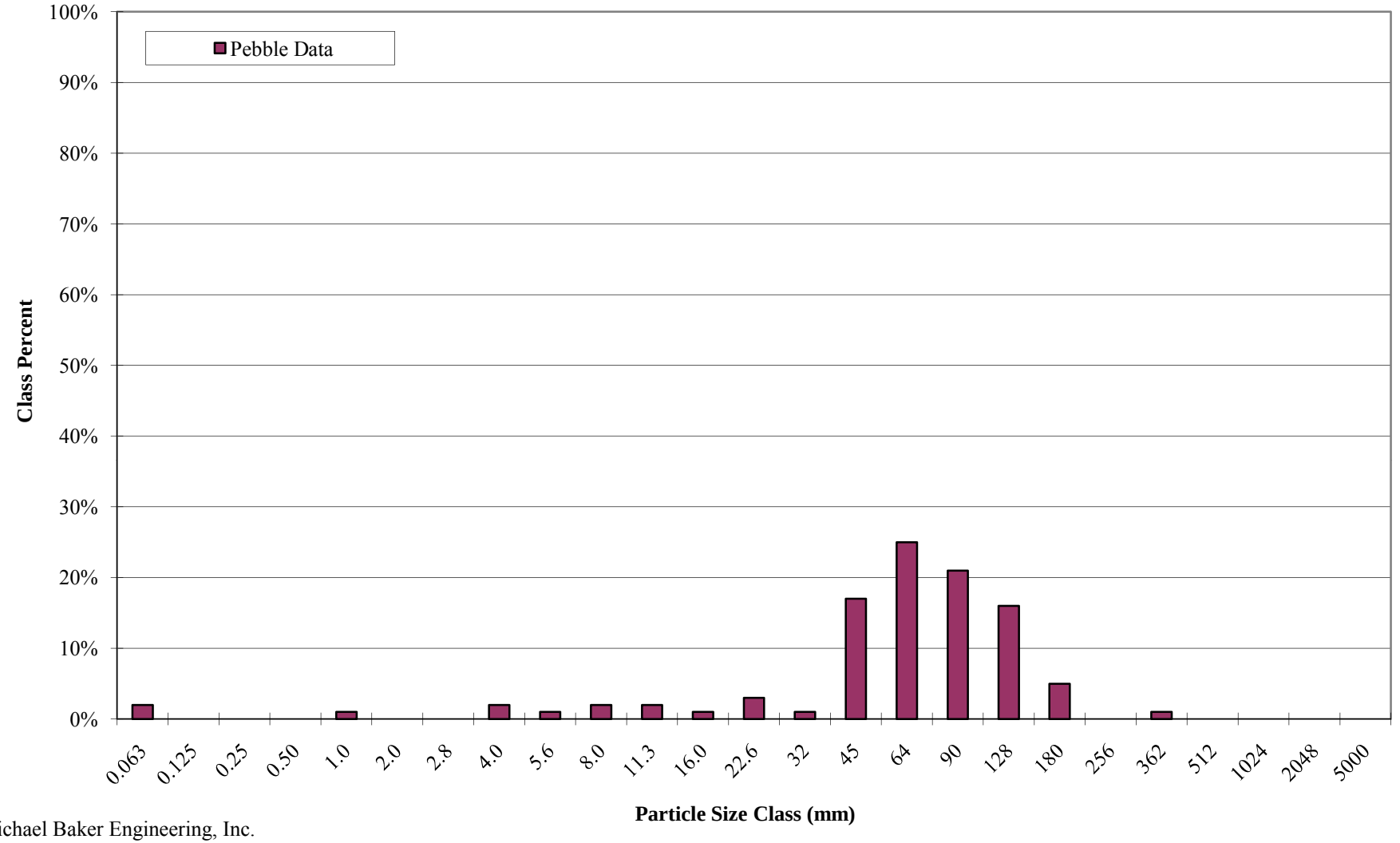
			PARTICLE CLASS COUNT	Summary	
MATERIAL	**PARTICLE**	**SIZE (mm)**	**Riffle**	**Class %**	**% Cum**
SILT/CLAY	Silt / Clay	< .063	2	2%	2%
SAND	Very Fine	.063 - .125			2%
	Fine	.125 - .25			2%
	Medium	.25 - .50			2%
	Coarse	.50 - 1.0	1	1%	3%
	Very Coarse	1.0 - 2.0			3%
GRAVEL	Very Fine	2.0 - 2.8			3%
	Very Fine	2.8 - 4.0	2	2%	5%
	Fine	4.0 - 5.6	1	1%	6%
	Fine	5.6 - 8.0	2	2%	8%
	Medium	8.0 - 11.0	2	2%	10%
	Medium	11.0 - 16.0	1	1%	11%
	Coarse	16.0 - 22.6	3	3%	14%
	Coarse	22.6 - 32	1	1%	15%
	Very Coarse	32 - 45	17	17%	32%
	Very Coarse	45 - 64	25	25%	57%
COBBLE	Small	64 - 90	21	21%	78%
	Small	90 - 128	16	16%	94%
	Large	128 - 180	5	5%	99%
	Large	180 - 256			99%
BOULDER	Small	256 - 362	1	1%	100%
	Small	362 - 512			100%
	Medium	512 - 1024			100%
	Large-Very Large	1024 - 2048			100%
BEDROCK	Bedrock	> 2048			100%
		Total	**100**	**100%**	

Largest particles: 330.00
(riffle)

Big Cedar Creek
BCC X10 - Riffle
Pebble Count Particle Size Distribution



Big Cedar Creek
BCC X10 - Riffle
Pebble Count Size Class Distribution



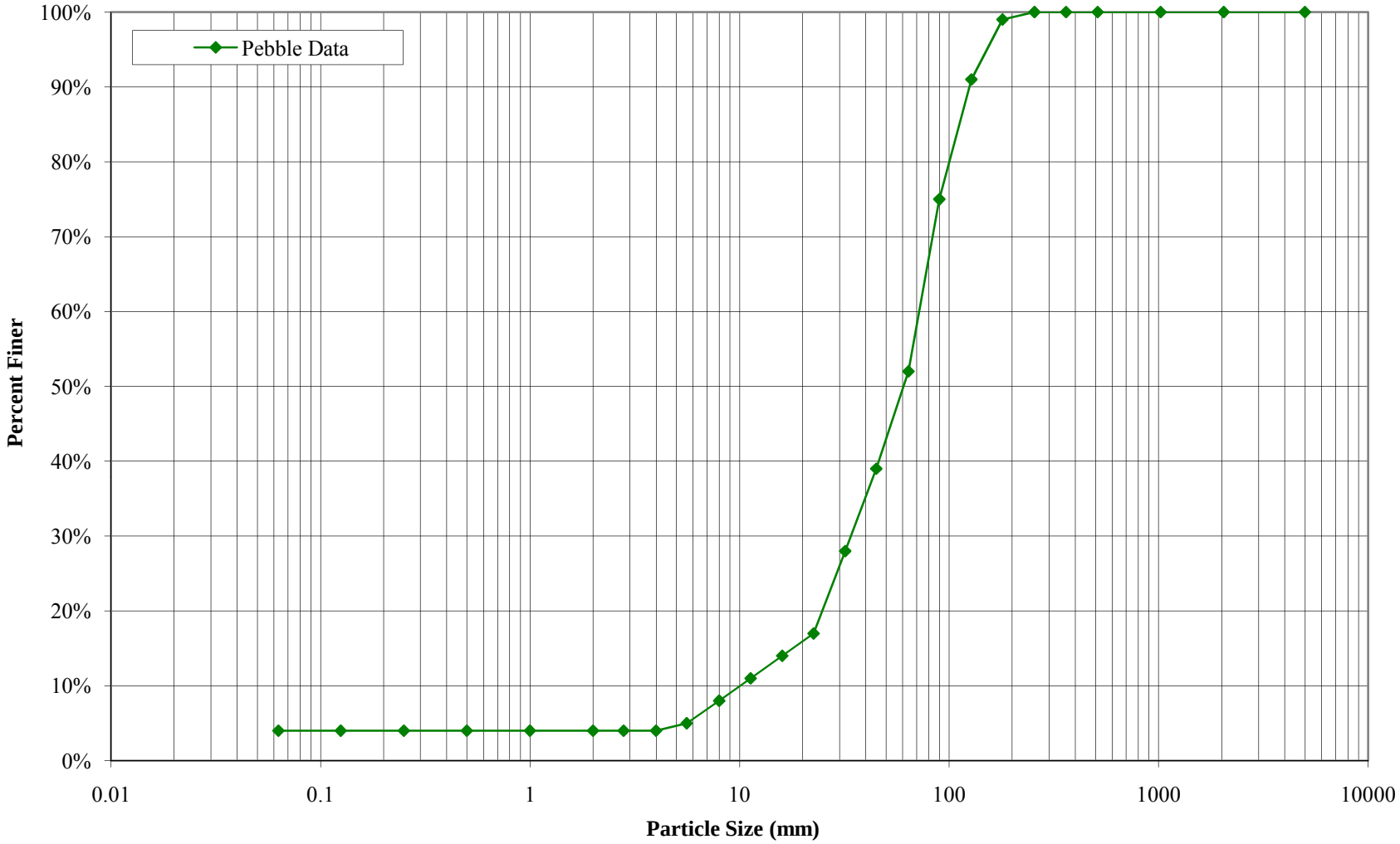
PEBBLE COUNT DATA SHEET: RIFFLE 100-COUNT

BAKER PROJECT NO.	109261
SITE OR PROJECT:	Big Cedar Creek Restoration - Year 1 Monitoring
REACH/LOCATION:	UT1 X14 Riffle
DATE COLLECTED:	10/13/2009
FIELD COLLECTION BY:	IE/CM
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary	
MATERIAL	PARTICLE	SIZE (mm)	Riffle	Class %	% Cum
SILT/CLAY	Silt / Clay	< .063	4	4%	4%
SAND	Very Fine	.063 - .125			4%
	Fine	.125 - .25			4%
	Medium	.25 - .50			4%
	Coarse	.50 - 1.0			4%
	Very Coarse	1.0 - 2.0			4%
GRAVEL	Very Fine	2.0 - 2.8			4%
	Very Fine	2.8 - 4.0			4%
	Fine	4.0 - 5.6	1	1%	5%
	Fine	5.6 - 8.0	3	3%	8%
	Medium	8.0 - 11.0	3	3%	11%
	Medium	11.0 - 16.0	3	3%	14%
	Coarse	16.0 - 22.6	3	3%	17%
	Coarse	22.6 - 32	11	11%	28%
	Very Coarse	32 - 45	11	11%	39%
	Very Coarse	45 - 64	13	13%	52%
COBBLE	Small	64 - 90	23	23%	75%
	Small	90 - 128	16	16%	91%
	Large	128 - 180	8	8%	99%
	Large	180 - 256	1	1%	100%
BOULDER	Small	256 - 362			100%
	Small	362 - 512			100%
	Medium	512 - 1024			100%
	Large-Very Large	1024 - 2048			100%
BEDROCK	Bedrock	> 2048			100%
		Total	**100**	**100%**	

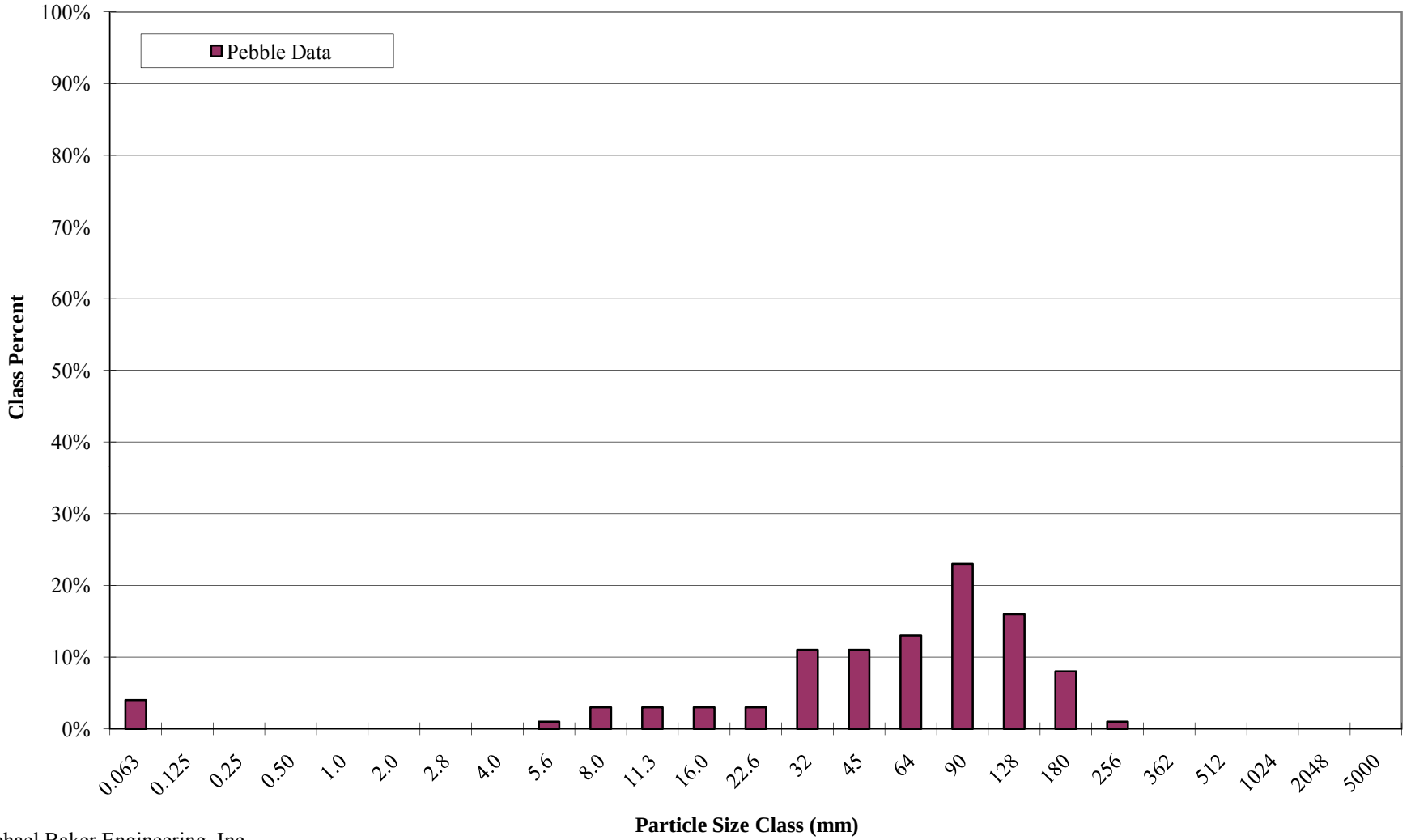
Largest particles: 200.00
(riffle)

Big Cedar Creek
UT1 X14 - Riffle
Pebble Count Particle Size Distribution



Michael Baker Engineering, Inc.
Big Cedar Creek Annual Monitoring Report
EEP Contract No. D06054-D
April 2010, Monitoring Year 1

Big Cedar Creek
UT1 X14 - Riffle
Pebble Count Size Class Distribution



PEBBLE COUNT DATA SHEET: POOL 100-COUNT

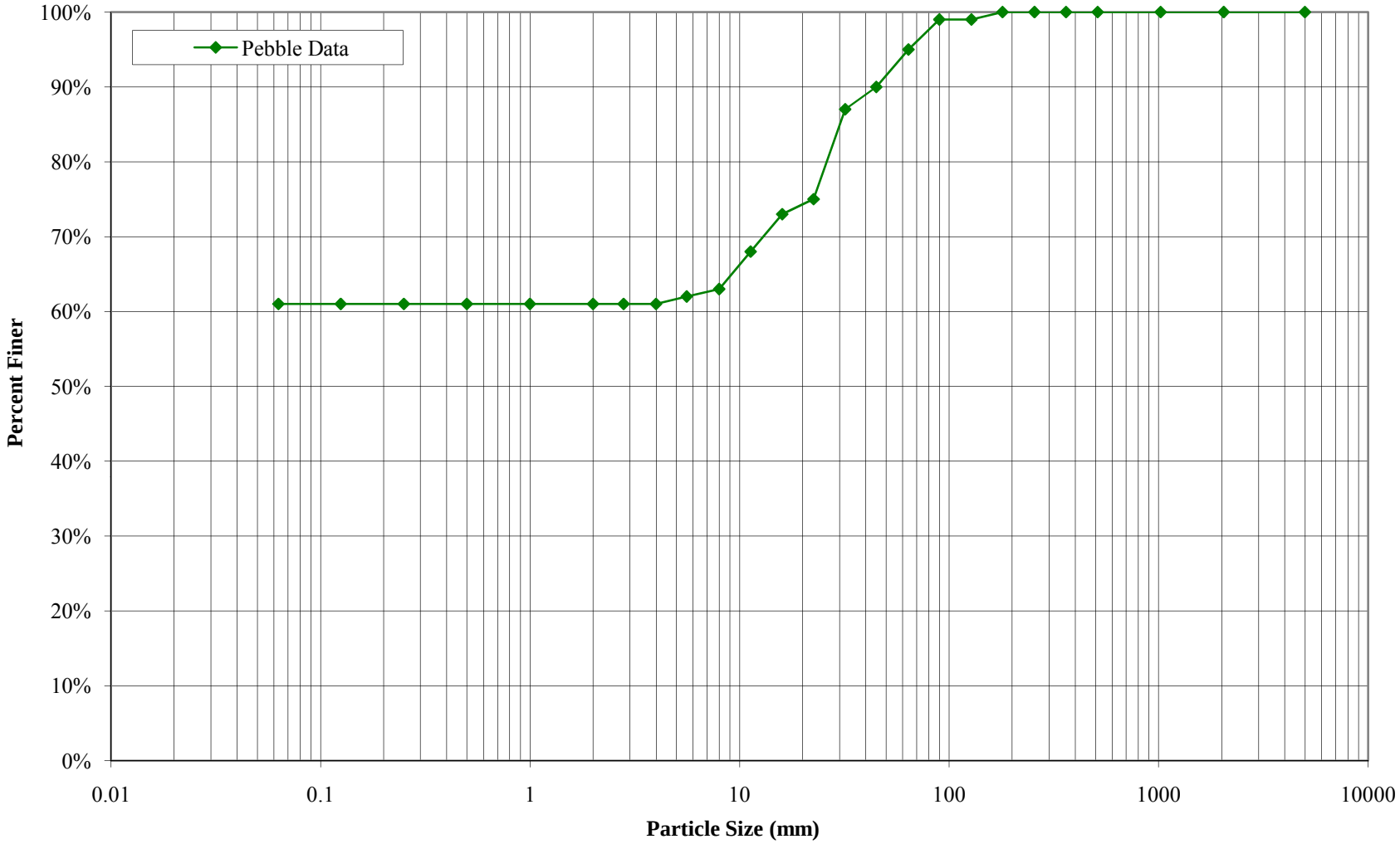
	BAKER PROJECT NO. 109261
SITE OR PROJECT:	Big Cedar Creek Restoration - Year 1 Monitoring
REACH/LOCATION:	UT1 X15 Pool
DATE COLLECTED:	10/13/2009
FIELD COLLECTION BY:	IE/CM
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary	
MATERIAL	PARTICLE	SIZE (mm)	Pool	Class %	% Cum
SILT/CLAY	Silt / Clay	< .063	61	61%	61%
SAND	Very Fine	.063 - .125			61%
	Fine	.125 - .25			61%
	Medium	.25 - .50			61%
	Coarse	.50 - 1.0			61%
	Very Coarse	1.0 - 2.0			61%
GRAVEL	Very Fine	2.0 - 2.8			61%
	Very Fine	2.8 - 4.0			61%
	Fine	4.0 - 5.6	1	1%	62%
	Fine	5.6 - 8.0	1	1%	63%
	Medium	8.0 - 11.0	5	5%	68%
	Medium	11.0 - 16.0	5	5%	73%
	Coarse	16.0 - 22.6	2	2%	75%
	Coarse	22.6 - 32	12	12%	87%
	Very Coarse	32 - 45	3	3%	90%
	Very Coarse	45 - 64	5	5%	95%
COBBLE	Small	64 - 90	4	4%	99%
	Small	90 - 128			99%
	Large	128 - 180	1	1%	100%
	Large	180 - 256			100%
BOULDER	Small	256 - 362			100%
	Small	362 - 512			100%
	Medium	512 - 1024			100%
	Large-Very Large	1024 - 2048			100%
BEDROCK	Bedrock	> 2048			100%
		Total	**100**	**100%**	

Largest particles: 180.00

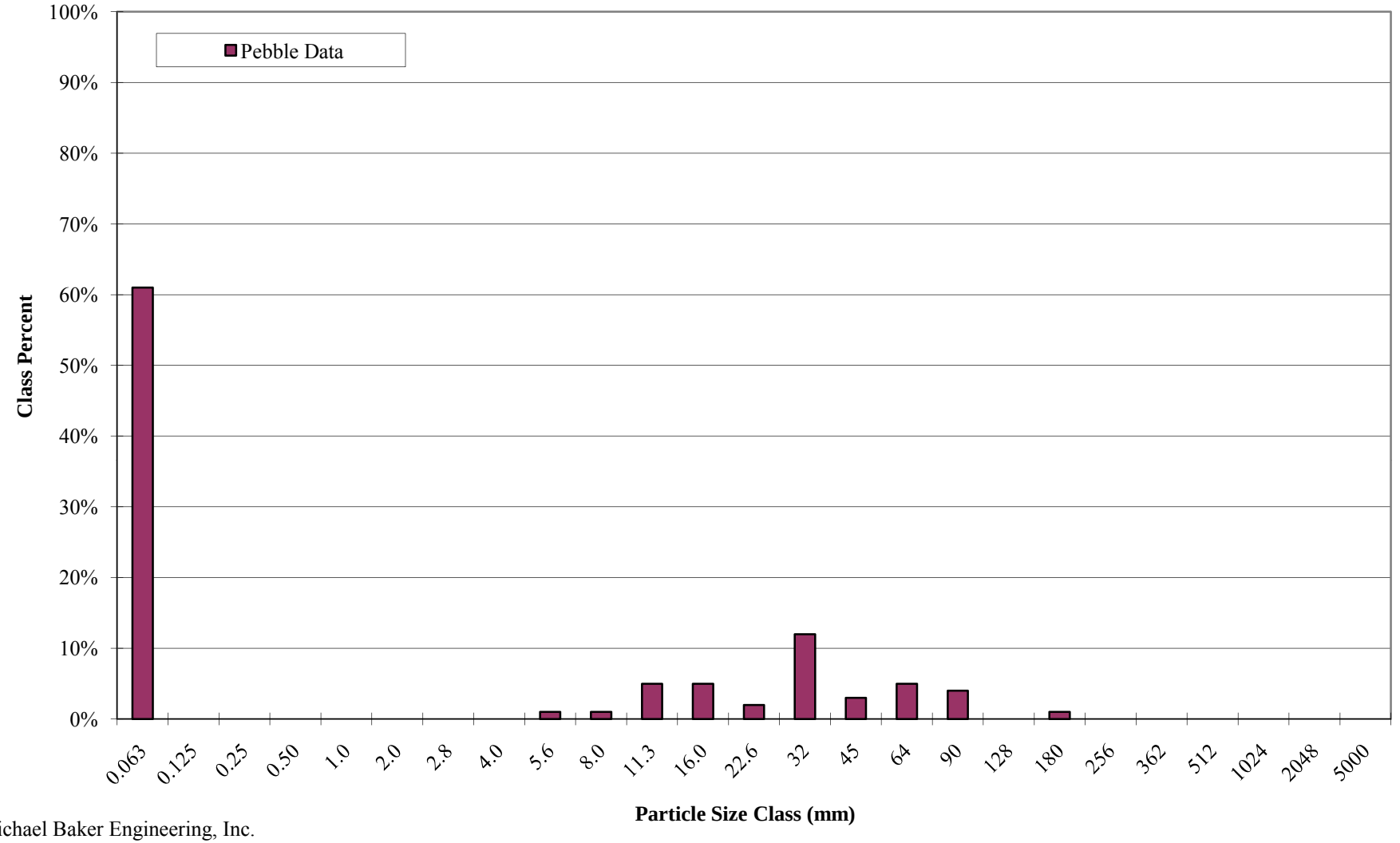
(pool)

Big Cedar Creek
UT1 X15 - Pool
Pebble Count Particle Size Distribution



Michael Baker Engineering, Inc.
Big Cedar Creek Annual Monitoring Report
EEP Contract No. D06054-D
April 2010, Monitoring Year 1

Big Cedar Creek
UT1 X15 - Pool
Riffle Pebble Count Size Class Distribution



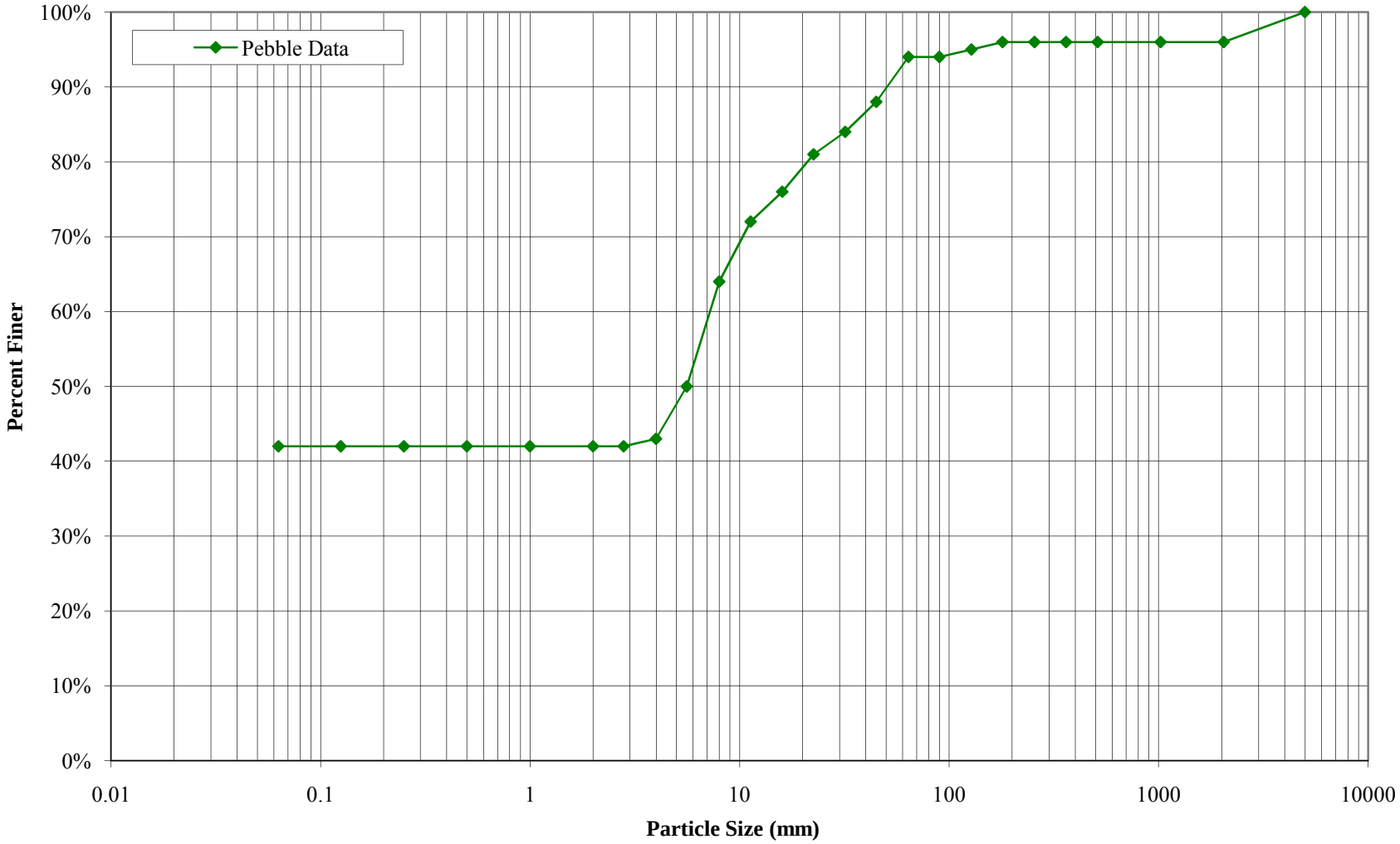
PEBBLE COUNT DATA SHEET: POOL 100-COUNT

BAKER PROJECT NO.	109261
SITE OR PROJECT:	Big Cedar Creek Restoration - Year 1 Monitoring
REACH/LOCATION:	UT1 X23 Pool
DATE COLLECTED:	10/13/2009
FIELD COLLECTION BY:	IE/CM
DATA ENTRY BY:	IE

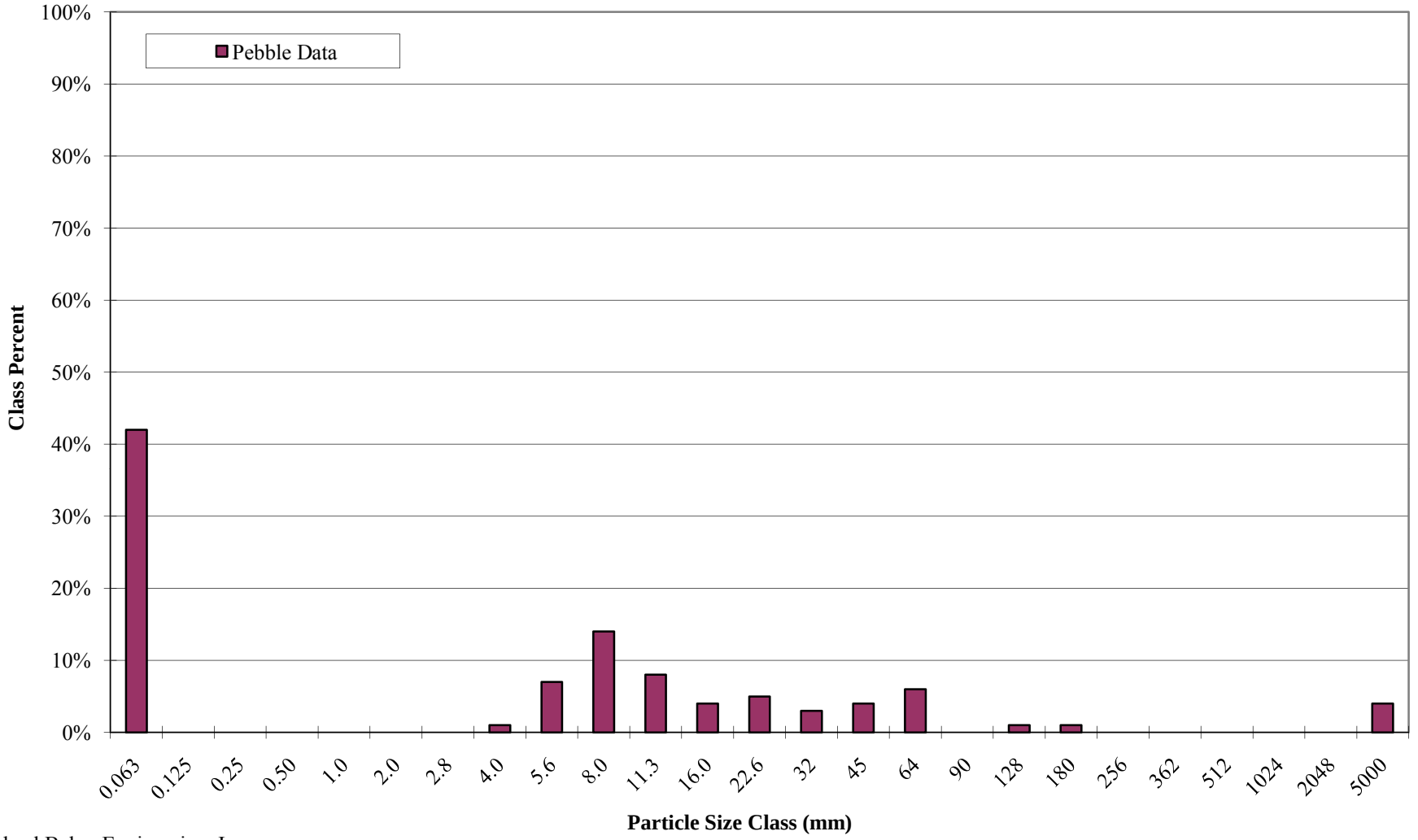
			PARTICLE CLASS COUNT	Summary	
MATERIAL	PARTICLE	SIZE (mm)	Pool	Class %	% Cum
SILT/CLAY	Silt / Clay	< .063	42	42%	42%
SAND	Very Fine	.063 - .125			42%
	Fine	.125 - .25			42%
	Medium	.25 - .50			42%
	Coarse	.50 - 1.0			42%
	Very Coarse	1.0 - 2.0			42%
GRAVEL	Very Fine	2.0 - 2.8			42%
	Very Fine	2.8 - 4.0	1	1%	43%
	Fine	4.0 - 5.6	7	7%	50%
	Fine	5.6 - 8.0	14	14%	64%
	Medium	8.0 - 11.0	8	8%	72%
	Medium	11.0 - 16.0	4	4%	76%
	Coarse	16.0 - 22.6	5	5%	81%
	Coarse	22.6 - 32	3	3%	84%
	Very Coarse	32 - 45	4	4%	88%
	Very Coarse	45 - 64	6	6%	94%
COBBLE	Small	64 - 90			94%
	Small	90 - 128	1	1%	95%
	Large	128 - 180	1	1%	96%
	Large	180 - 256			96%
BOULDER	Small	256 - 362			96%
	Small	362 - 512			96%
	Medium	512 - 1024			96%
	Large-Very Large	1024 - 2048			96%
BEDROCK	Bedrock	> 2048	4	4%	100%
		Total	**100**	**100%**	

Largest particles: 180.00 **(pool)**

Big Cedar Creek
UT1 X23 - Pool
Pebble Count Particle Size Distribution



Big Cedar Creek
UT1 X23 - Pool
Pebble Count Size Class Distribution



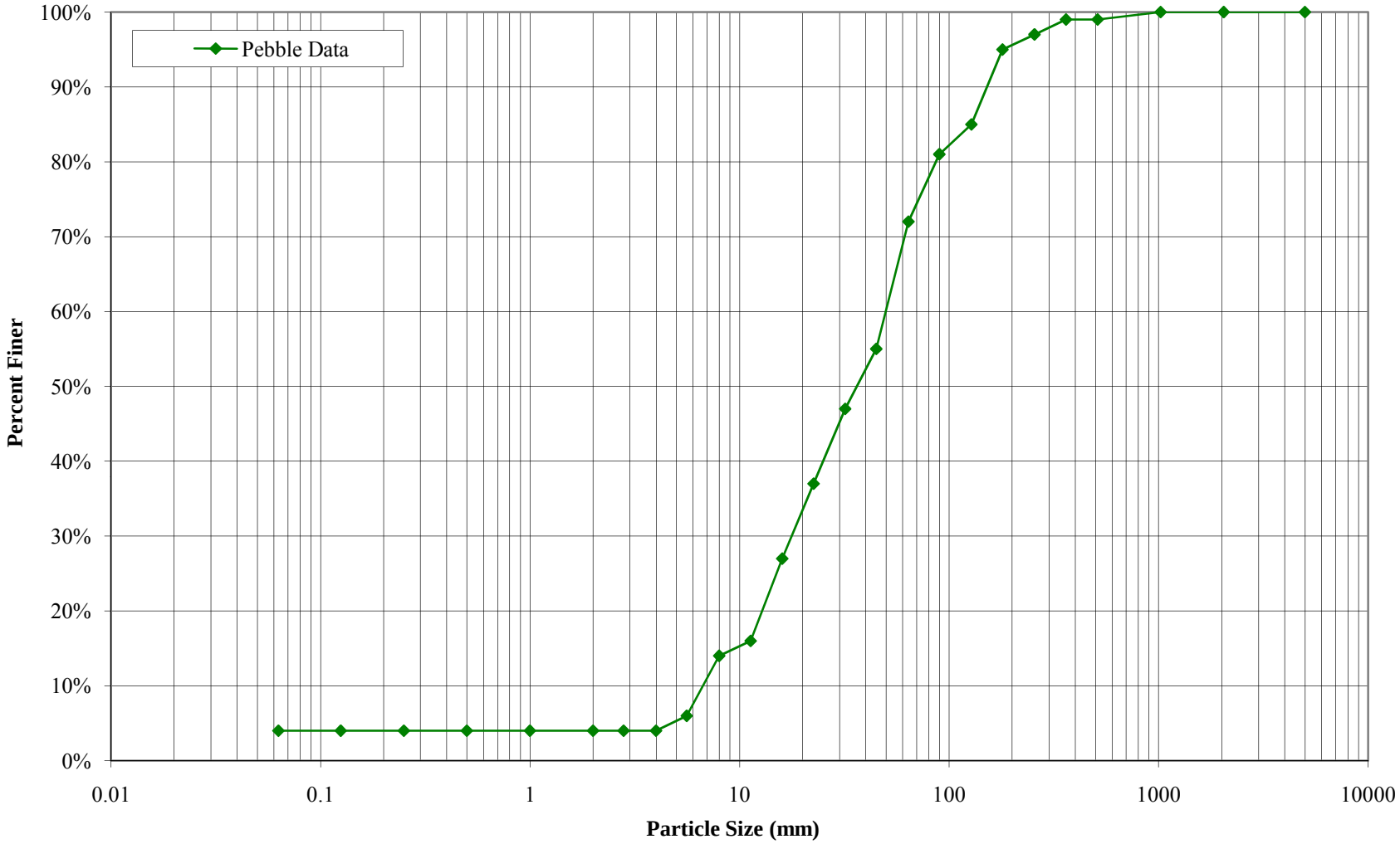
PEBBLE COUNT DATA SHEET: RIFFLE 100-COUNT

BAKER PROJECT NO.	109261
SITE OR PROJECT:	Big Cedar Creek Restoration - Year 1 Monitoring
REACH/LOCATION:	UT1 X24 Riffle
DATE COLLECTED:	10/13/2009
FIELD COLLECTION BY:	IE/CM
DATA ENTRY BY:	IE

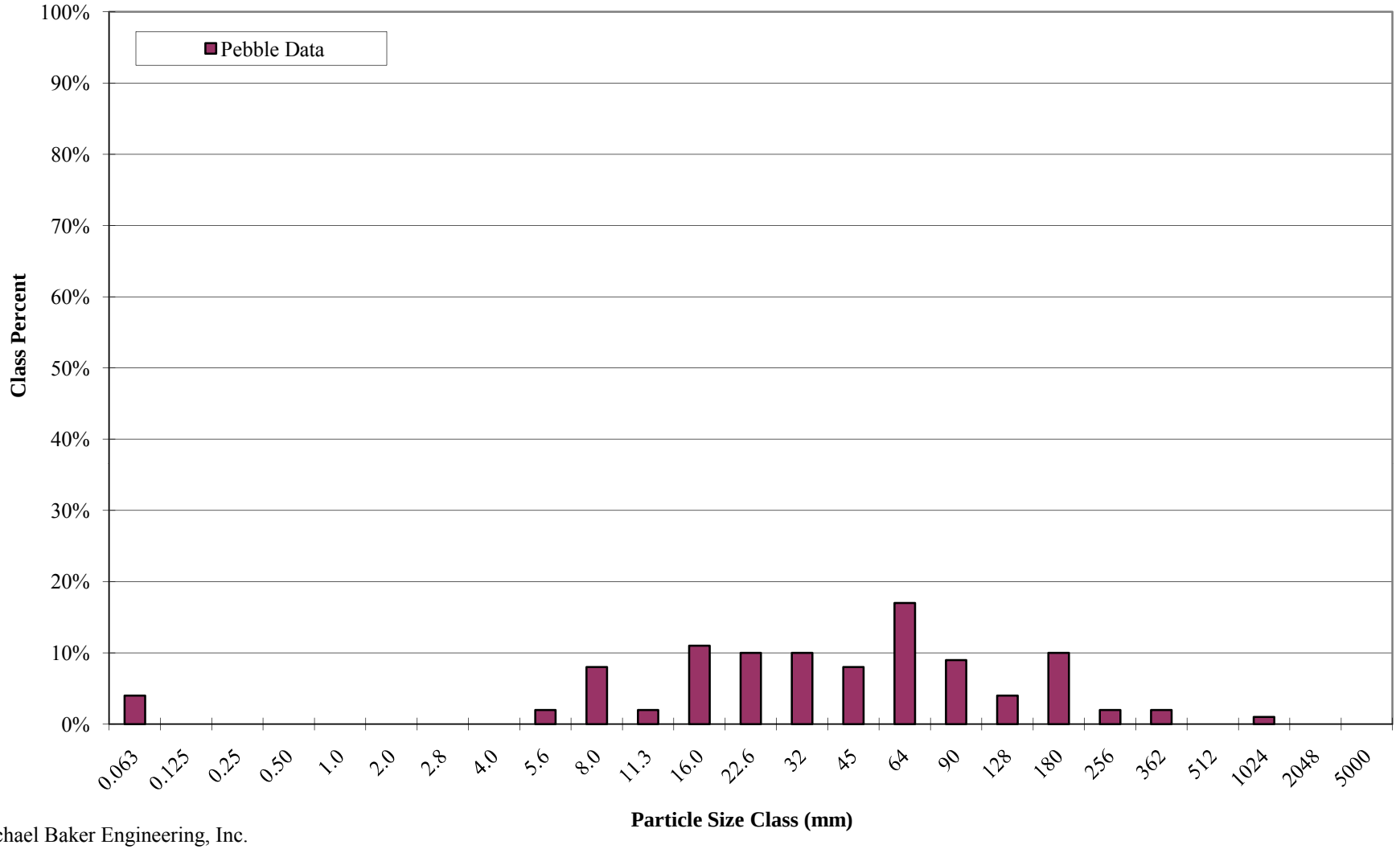
			PARTICLE CLASS COUNT	Summary	
MATERIAL	**PARTICLE**	**SIZE (mm)**	**Riffle**	**Class %**	**% Cum**
SILT/CLAY	Silt / Clay	< .063	4	4%	4%
SAND	Very Fine	.063 - .125			4%
	Fine	.125 - .25			4%
	Medium	.25 - .50			4%
	Coarse	.50 - 1.0			4%
	Very Coarse	1.0 - 2.0			4%
GRAVEL	Very Fine	2.0 - 2.8			4%
	Very Fine	2.8 - 4.0			4%
	Fine	4.0 - 5.6	2	2%	6%
	Fine	5.6 - 8.0	8	8%	14%
	Medium	8.0 - 11.0	2	2%	16%
	Medium	11.0 - 16.0	11	11%	27%
	Coarse	16.0 - 22.6	10	10%	37%
	Coarse	22.6 - 32	10	10%	47%
	Very Coarse	32 - 45	8	8%	55%
	Very Coarse	45 - 64	17	17%	72%
COBBLE	Small	64 - 90	9	9%	81%
	Small	90 - 128	4	4%	85%
	Large	128 - 180	10	10%	95%
	Large	180 - 256	2	2%	97%
BOULDER	Small	256 - 362	2	2%	99%
	Small	362 - 512			99%
	Medium	512 - 1024	1	1%	100%
	Large-Very Large	1024 - 2048			100%
BEDROCK	Bedrock	> 2048			100%
		Total	**100**	**100%**	

Largest particles: 620.00 **(riffle)**

Big Cedar Creek
UT1 X24 - Riffle
Pebble Count Particle Size Distribution



Big Cedar Creek
UT1 X24 - Riffle
Pebble Count Size Class Distribution



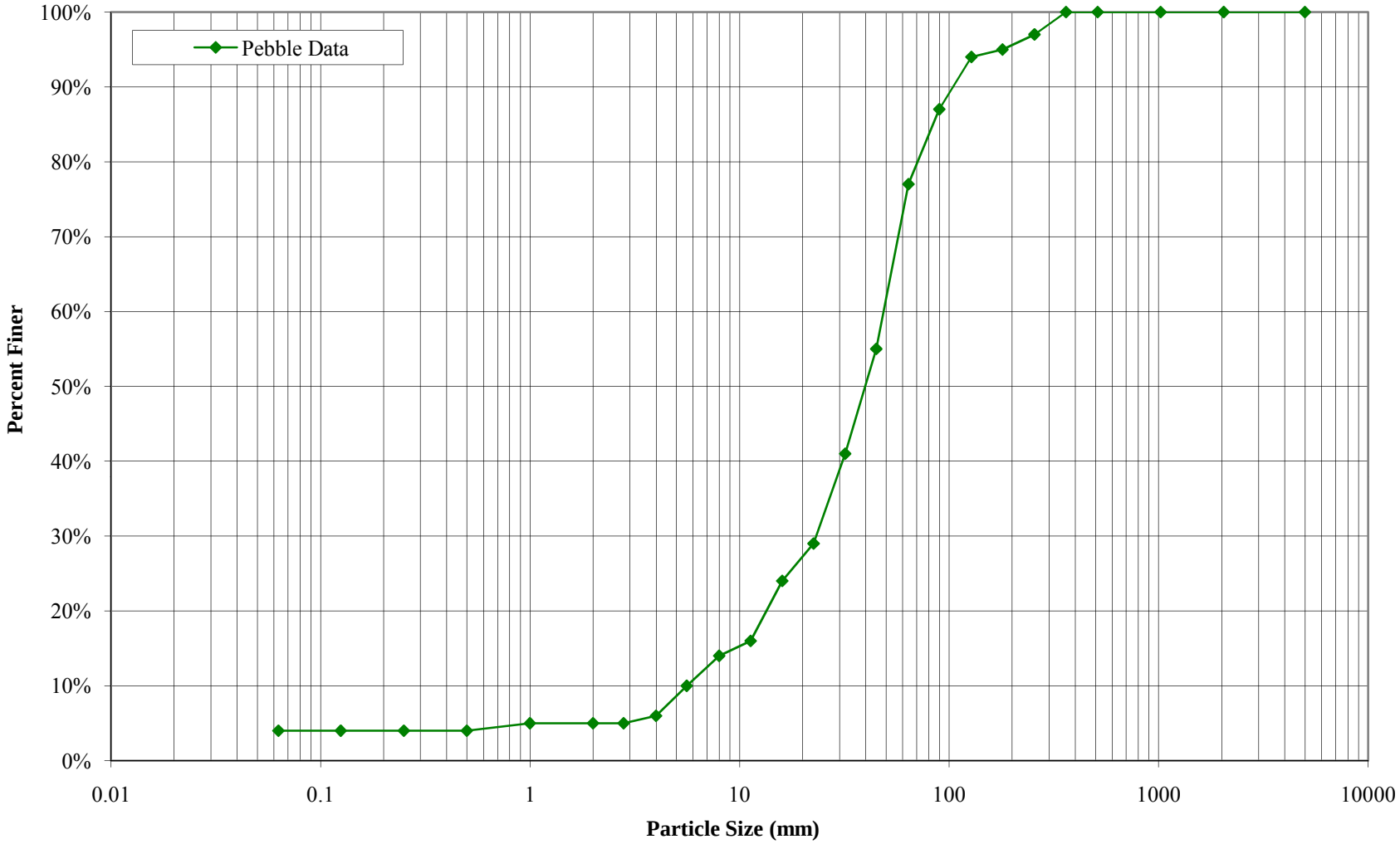
PEBBLE COUNT DATA SHEET: RIFFLE 100-COUNT

BAKER PROJECT NO.	109261
SITE OR PROJECT:	Big Cedar Creek Restoration - Year 1 Monitoring
REACH/LOCATION:	UT1 X28 Riffle
DATE COLLECTED:	10/13/2009
FIELD COLLECTION BY:	IE/CM
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary	
MATERIAL	PARTICLE	SIZE (mm)	Riffle	Class %	% Cum
SILT/CLAY	Silt / Clay	< .063	4	4%	4%
SAND	Very Fine	.063 - .125			4%
	Fine	.125 - .25			4%
	Medium	.25 - .50			4%
	Coarse	.50 - 1.0	1	1%	5%
	Very Coarse	1.0 - 2.0			5%
GRAVEL	Very Fine	2.0 - 2.8			5%
	Very Fine	2.8 - 4.0	1	1%	6%
	Fine	4.0 - 5.6	4	4%	10%
	Fine	5.6 - 8.0	4	4%	14%
	Medium	8.0 - 11.0	2	2%	16%
	Medium	11.0 - 16.0	8	8%	24%
	Coarse	16.0 - 22.6	5	5%	29%
	Coarse	22.6 - 32	12	12%	41%
	Very Coarse	32 - 45	14	14%	55%
	Very Coarse	45 - 64	22	22%	77%
COBBLE	Small	64 - 90	10	10%	87%
	Small	90 - 128	7	7%	94%
	Large	128 - 180	1	1%	95%
	Large	180 - 256	2	2%	97%
BOULDER	Small	256 - 362	3	3%	100%
	Small	362 - 512			100%
	Medium	512 - 1024			100%
	Large-Very Large	1024 - 2048			100%
BEDROCK	Bedrock	> 2048			100%
		Total	**100**	**100%**	

Largest particles: 360.00 **(riffle)**

Big Cedar Creek
UT1 X28 - Riffle
Pebble Count Particle Size Distribution



Michael Baker Engineering, Inc.
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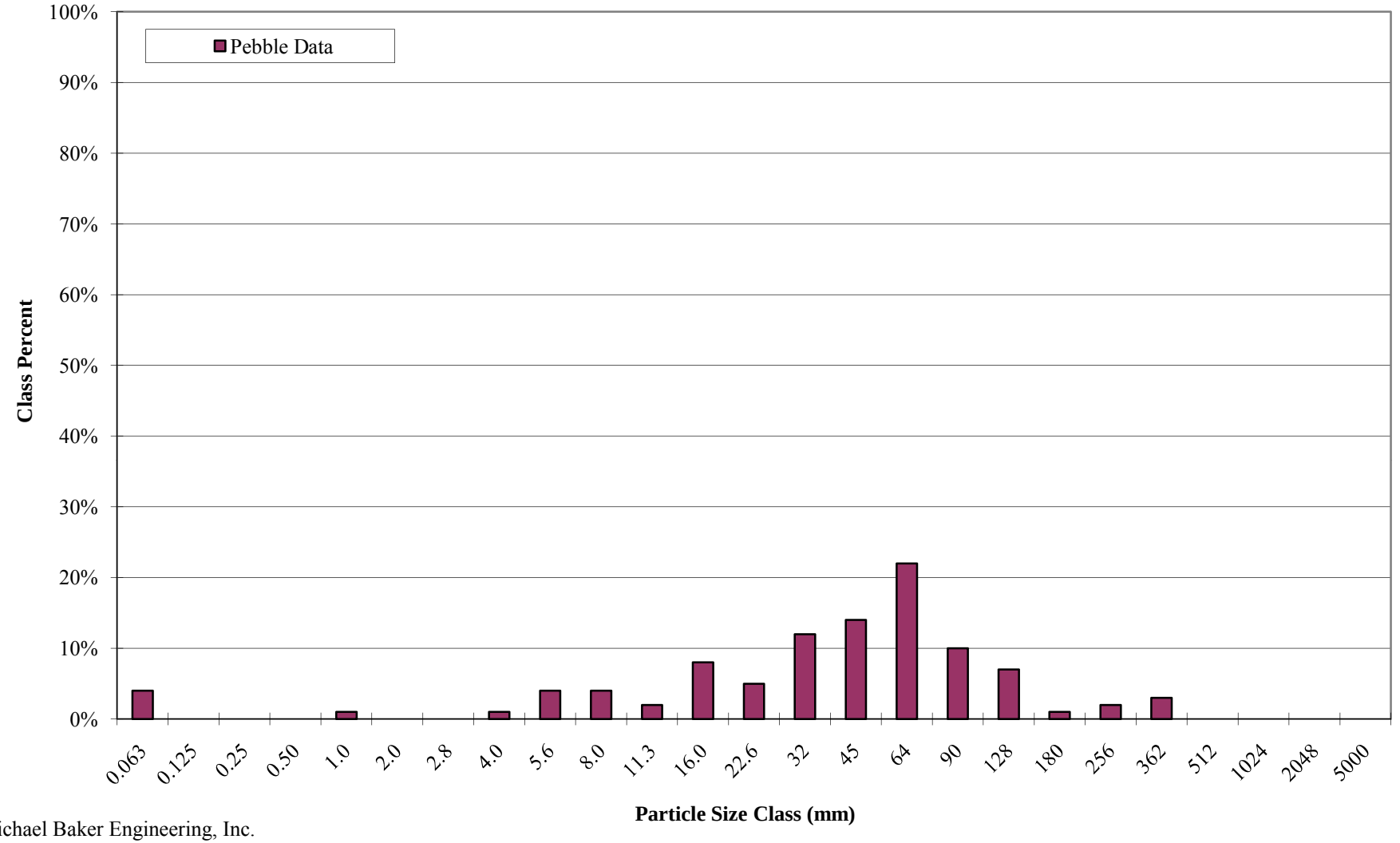
EEP Contract No. D06054-D
April 2010, Monitoring Year 1

Big Cedar Creek
UT1 X28 - Riffle
Pebble Count Size Class Distribution



PEBBLE COUNT DATA SHEET: POOL 100-COUNT

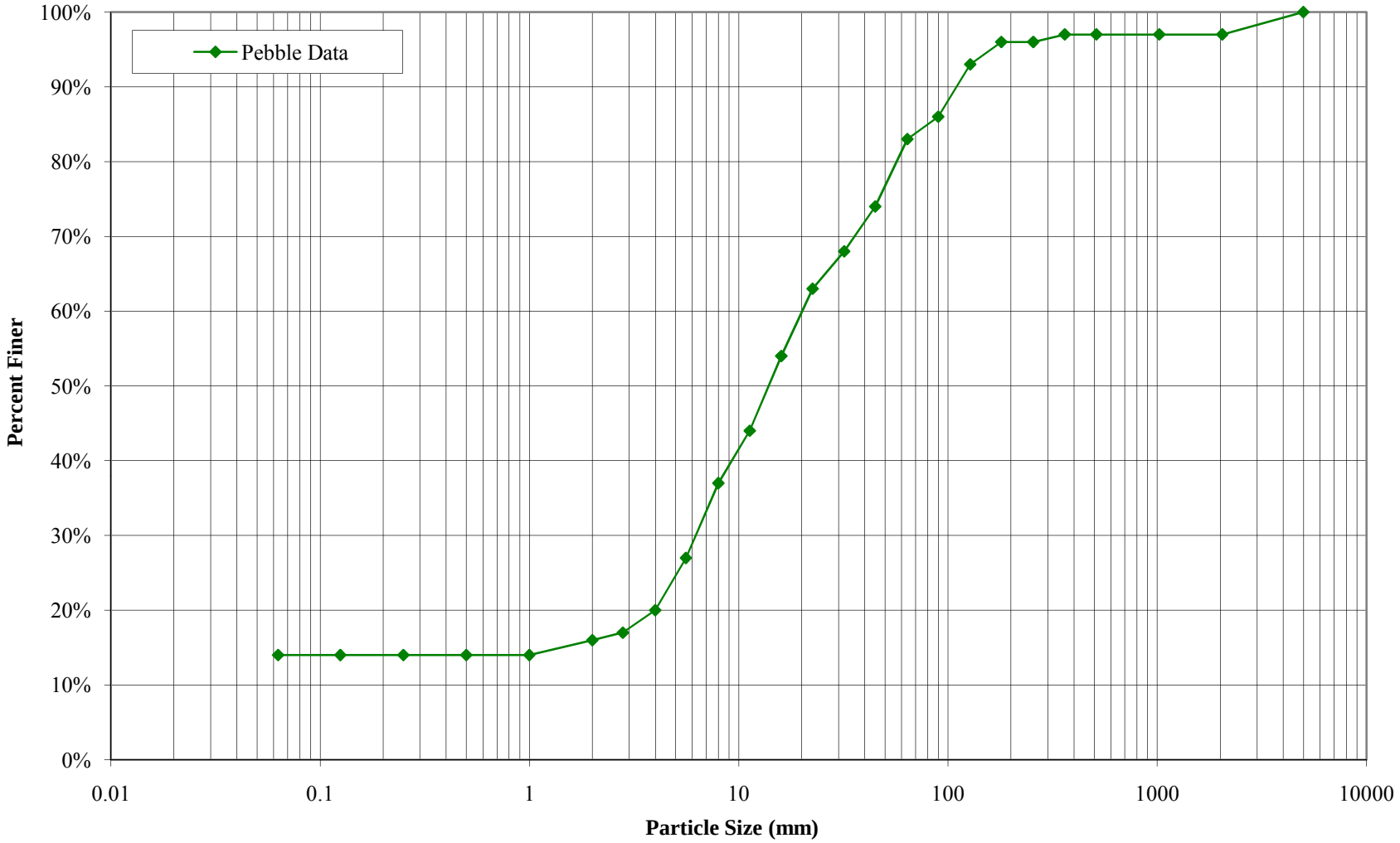
BAKER PROJECT NO.	109261
SITE OR PROJECT:	Big Cedar Creek Restoration - Year 1 Monitoring
REACH/LOCATION:	UT1 X29 Pool
DATE COLLECTED:	10/13/2009
FIELD COLLECTION BY:	IE/CM
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary	
MATERIAL	PARTICLE	SIZE (mm)	Pool	Class %	% Cum
SILT/CLAY	Silt / Clay	< .063	14	14%	14%
SAND	Very Fine	.063 - .125			14%
	Fine	.125 - .25			14%
	Medium	.25 - .50			14%
	Coarse	.50 - 1.0			14%
	Very Coarse	1.0 - 2.0	2	2%	16%
GRAVEL	Very Fine	2.0 - 2.8	1	1%	17%
	Very Fine	2.8 - 4.0	3	3%	20%
	Fine	4.0 - 5.6	7	7%	27%
	Fine	5.6 - 8.0	10	10%	37%
	Medium	8.0 - 11.0	7	7%	44%
	Medium	11.0 - 16.0	10	10%	54%
	Coarse	16.0 - 22.6	9	9%	63%
	Coarse	22.6 - 32	5	5%	68%
	Very Coarse	32 - 45	6	6%	74%
	Very Coarse	45 - 64	9	9%	83%
COBBLE	Small	64 - 90	3	3%	86%
	Small	90 - 128	7	7%	93%
	Large	128 - 180	3	3%	96%
	Large	180 - 256			96%
BOULDER	Small	256 - 362	1	1%	97%
	Small	362 - 512			97%
	Medium	512 - 1024			97%
	Large-Very Large	1024 - 2048			97%
BEDROCK	Bedrock	> 2048	3	3%	100%
		Total	**100**	**100%**	

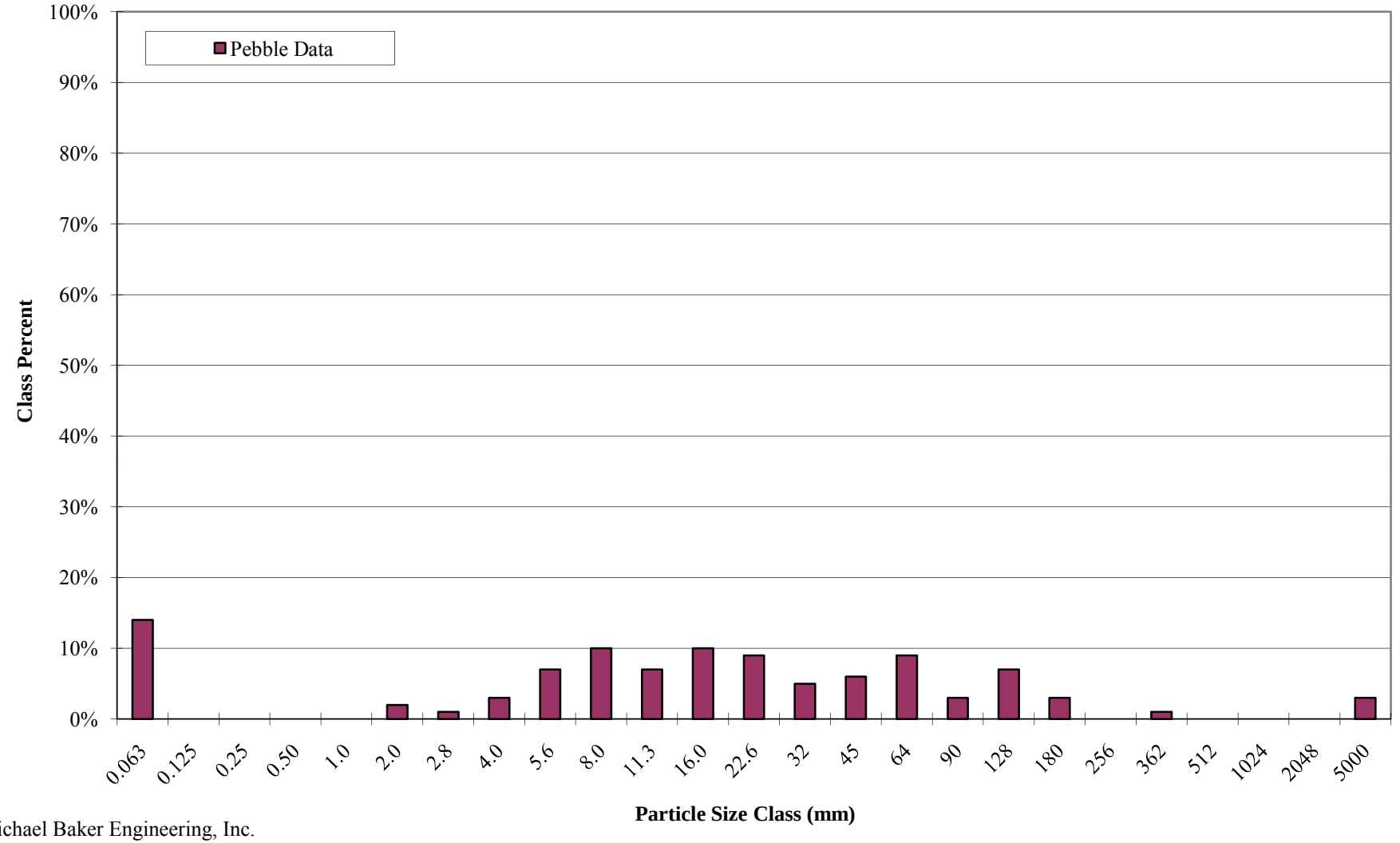
Largest particles: 300.00

(pool)

Big Cedar Creek
UT1 X29 - Pool
Pebble Count Particle Size Distribution



Big Cedar Creek
UT1 X29 - Pool
Pebble Count Size Class Distribution



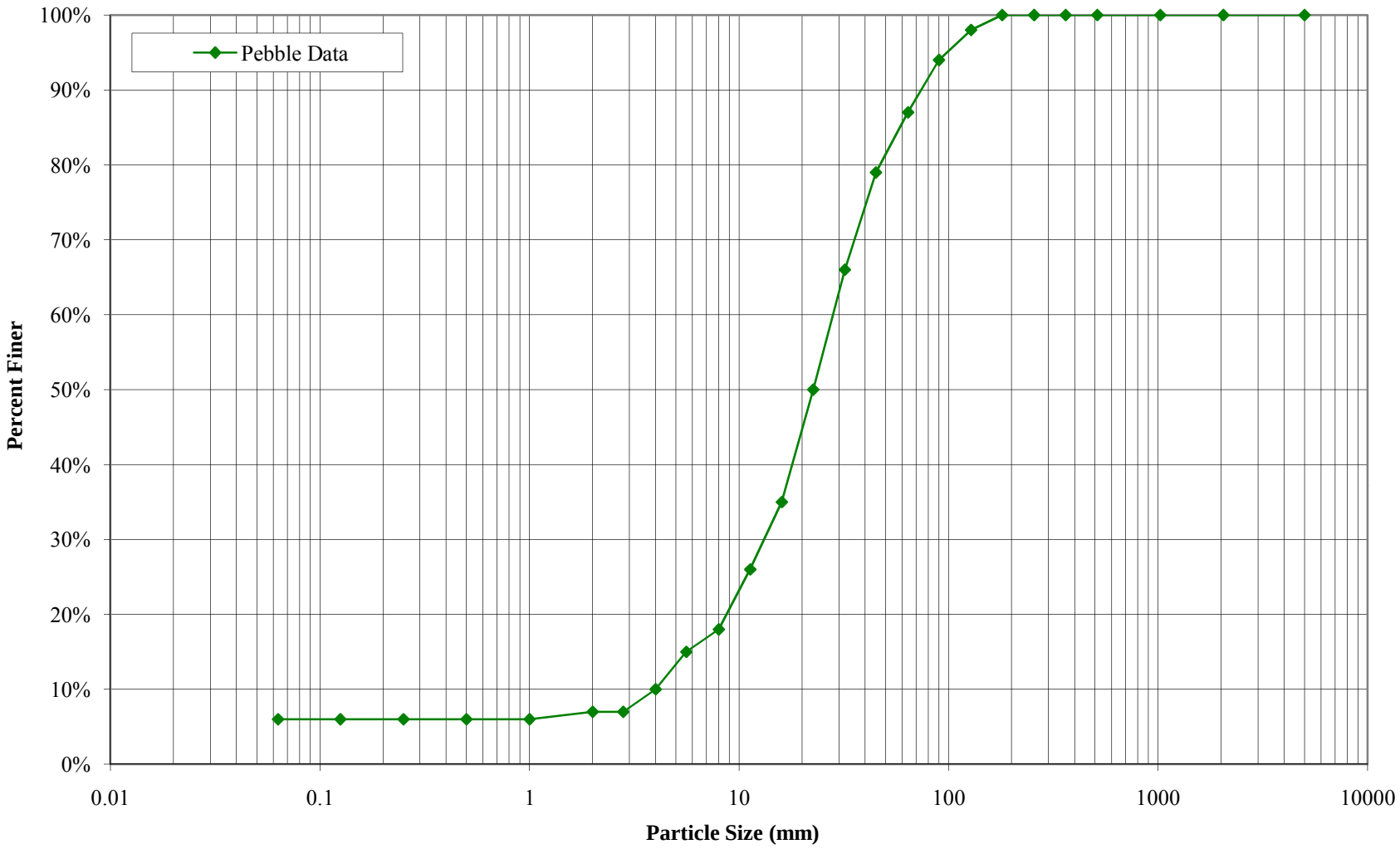
PEBBLE COUNT DATA SHEET: RIFFLE 100-COUNT

BAKER PROJECT NO.	109261
SITE OR PROJECT:	Big Cedar Creek Restoration - Year 1 Monitoring
REACH/LOCATION:	UT2 X32 Riffle
DATE COLLECTED:	10/13/2009
FIELD COLLECTION BY:	IE/CM
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary	
MATERIAL	**PARTICLE**	**SIZE (mm)**	**Riffle**	**Class %**	**% Cum**
SILT/CLAY	Silt / Clay	< .063	6	6%	6%
SAND	Very Fine	.063 - .125			6%
	Fine	.125 - .25			6%
	Medium	.25 - .50			6%
	Coarse	.50 - 1.0			6%
	Very Coarse	1.0 - 2.0	1	1%	7%
GRAVEL	Very Fine	2.0 - 2.8			7%
	Very Fine	2.8 - 4.0	3	3%	10%
	Fine	4.0 - 5.6	5	5%	15%
	Fine	5.6 - 8.0	3	3%	18%
	Medium	8.0 - 11.0	8	8%	26%
	Medium	11.0 - 16.0	9	9%	35%
	Coarse	16.0 - 22.6	15	15%	50%
	Coarse	22.6 - 32	16	16%	66%
	Very Coarse	32 - 45	13	13%	79%
	Very Coarse	45 - 64	8	8%	87%
COBBLE	Small	64 - 90	7	7%	94%
	Small	90 - 128	4	4%	98%
	Large	128 - 180	2	2%	100%
	Large	180 - 256			100%
BOULDER	Small	256 - 362			100%
	Small	362 - 512			100%
	Medium	512 - 1024			100%
	Large-Very Large	1024 - 2048			100%
BEDROCK	Bedrock	> 2048			100%
		Total	**100**	**100%**	

Largest particles: 170.00 **(riffle)**

Big Cedar Creek
UT2 X32 - Riffle
Pebble Count Particle Size Distribution



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Big Cedar Creek Annual Monitoring Report
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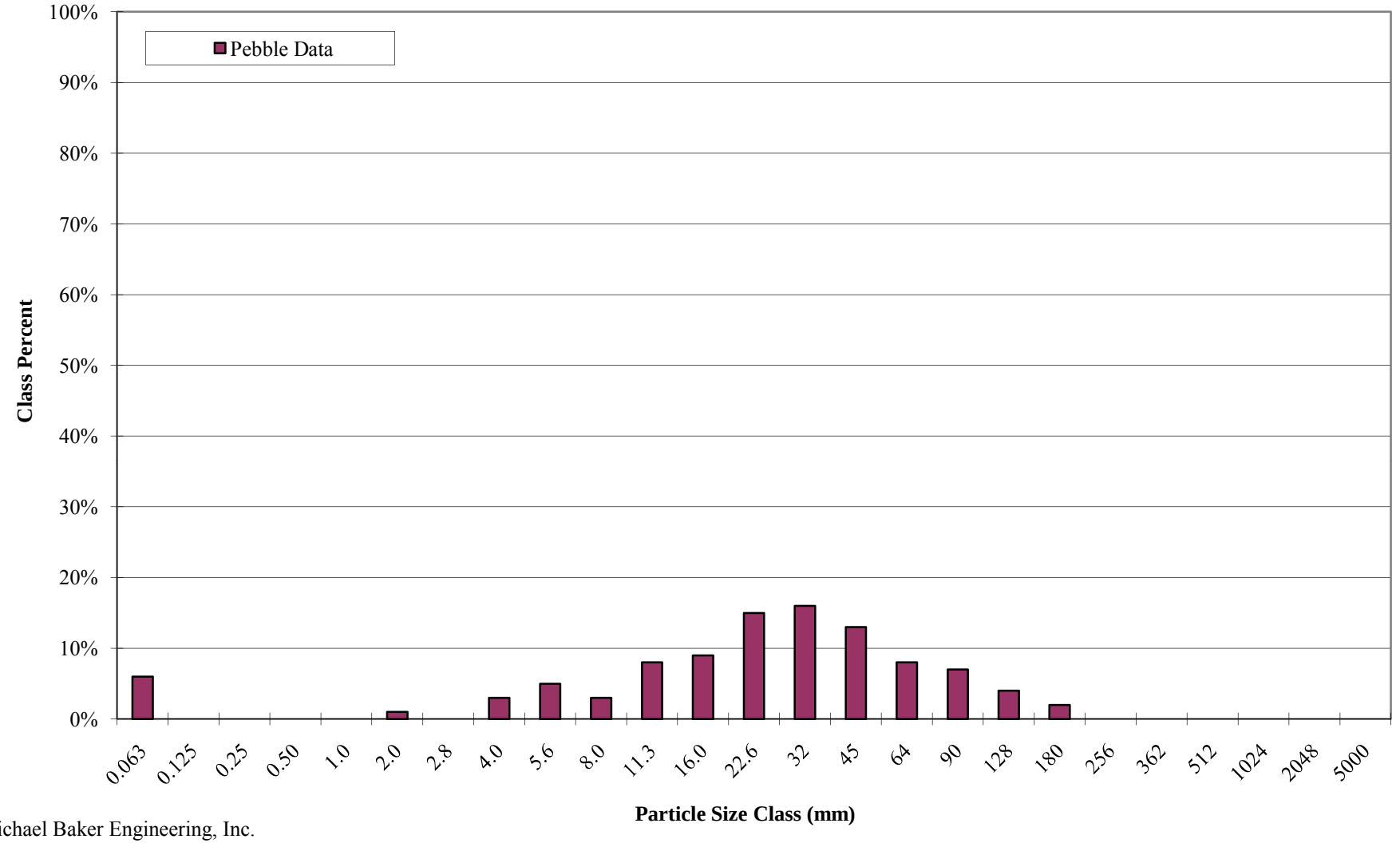
April 2010, Monitoring Year 1

Big Cedar Creek
UT2 X32 - Riffle
Pebble Count Size Class Distribution



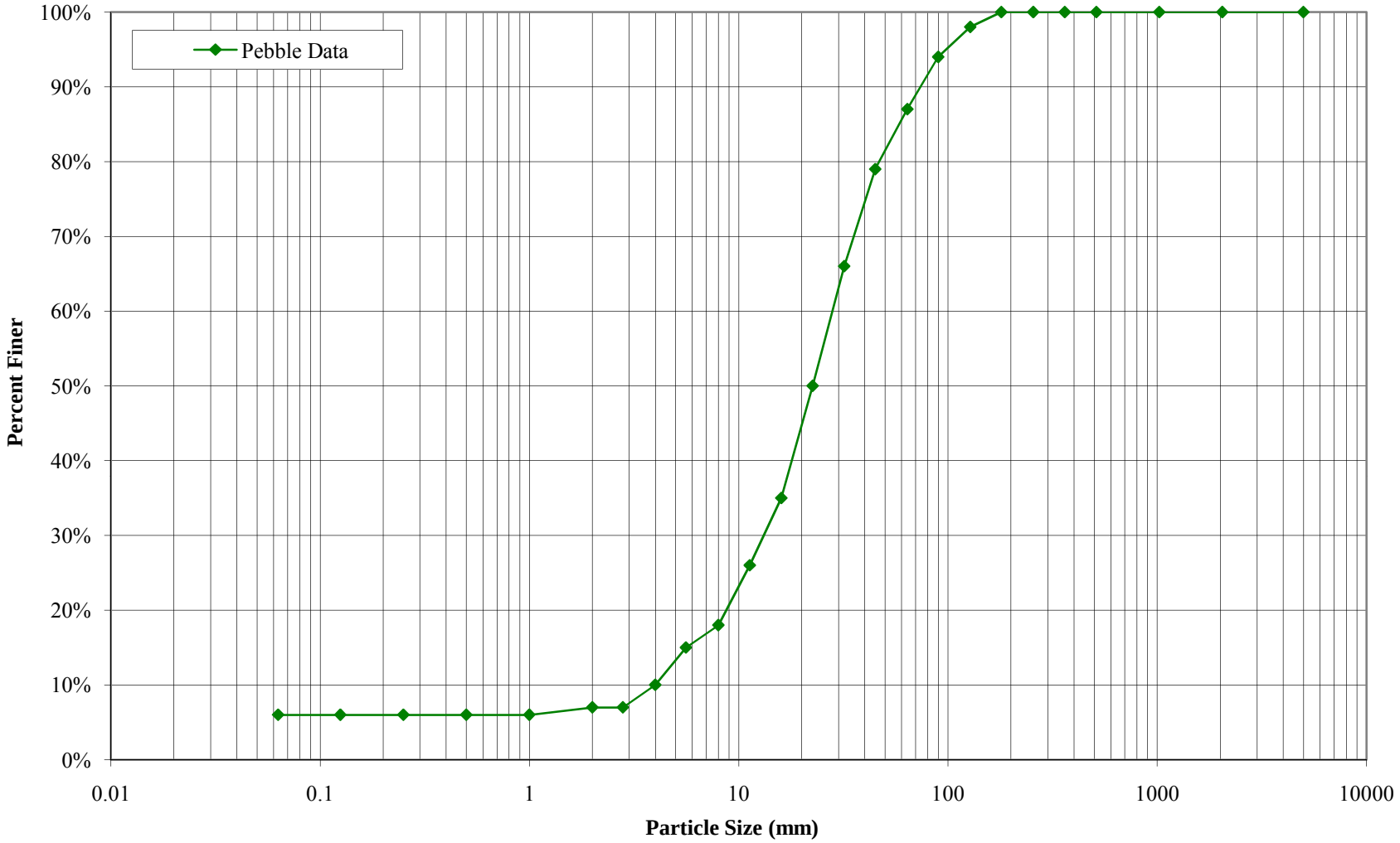
PEBBLE COUNT DATA SHEET: POOL 100-COUNT

	BAKER PROJECT NO. 109261
SITE OR PROJECT:	Big Cedar Creek Restoration - Year 1 Monitoring
REACH/LOCATION:	UT2 X33 Pool
DATE COLLECTED:	10/13/2009
FIELD COLLECTION BY:	IE/CM
DATA ENTRY BY:	IE

			PARTICLE CLASS COUNT	Summary	
MATERIAL	PARTICLE	SIZE (mm)	Pool	Class %	% Cum
SILT/CLAY	Silt / Clay	< .063	6	6%	6%
SAND	Very Fine	.063 - .125			6%
	Fine	.125 - .25			6%
	Medium	.25 - .50			6%
	Coarse	.50 - 1.0			6%
	Very Coarse	1.0 - 2.0	1	1%	7%
GRAVEL	Very Fine	2.0 - 2.8			7%
	Very Fine	2.8 - 4.0	3	3%	10%
	Fine	4.0 - 5.6	5	5%	15%
	Fine	5.6 - 8.0	3	3%	18%
	Medium	8.0 - 11.0	8	8%	26%
	Medium	11.0 - 16.0	9	9%	35%
	Coarse	16.0 - 22.6	15	15%	50%
	Coarse	22.6 - 32	16	16%	66%
	Very Coarse	32 - 45	13	13%	79%
	Very Coarse	45 - 64	8	8%	87%
COBBLE	Small	64 - 90	7	7%	94%
	Small	90 - 128	4	4%	98%
	Large	128 - 180	2	2%	100%
	Large	180 - 256			100%
BOULDER	Small	256 - 362			100%
	Small	362 - 512			100%
	Medium	512 - 1024			100%
	Large-Very Large	1024 - 2048			100%
BEDROCK	Bedrock	> 2048			100%
		Total	**100**	**100%**	

Largest particles: 180.00
(pool)

Big Cedar Creek
UT2 X33 - Pool
Pebble Count Particle Size Distribution



Big Cedar Creek
UT2 X33 - Pool
Pebble Count Size Class Distribution

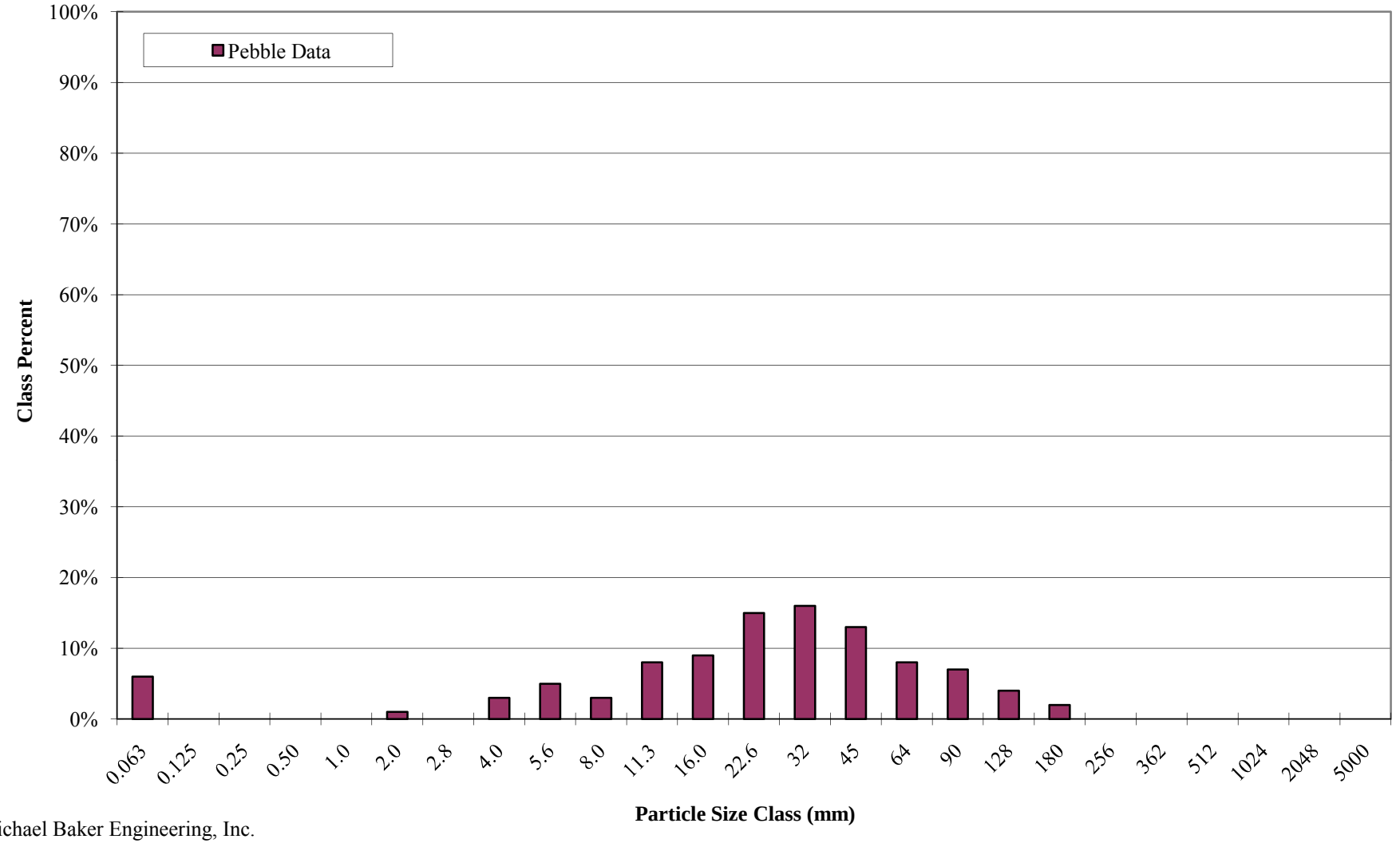


Table 7. Baseline Stream Summary
Big Cedar Creek Restoration Site Contract No. D06054-D
BCC Reach 1 (603 LF)

Parameter	USGS Gauge	Regional Curve Interval			Pre-Existing Condition						Reference Reach(es) Data Morgan Creek					
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																
BF Width (ft)	-----	10.0	35.0	18.7	-----	16.3	-----	-----	-----	1	-----	33.2	-----	-----	-----	2
Floodprone Width (ft)	-----	-----	-----	-----	-----	>126.6	-----	-----	-----	1	-----	77.5	-----	-----	-----	2
BF Mean Depth (ft)	-----	1.3	3.1	2.1	-----	2.3	-----	-----	-----	1	-----	2.3	-----	-----	-----	2
BF Max Depth (ft)	-----	-----	-----	-----	-----	2.8	-----	-----	-----	1	-----	2.8	-----	-----	-----	2
BF Cross-sectional Area (ft^2)	-----	18.0	68.0	43.7	-----	36.7	-----	-----	-----	1	-----	75.1	-----	-----	-----	2
Width/Depth Ratio	-----	-----	-----	-----	-----	7.1	-----	-----	-----	1	-----	14.1	-----	-----	-----	2
Entrenchment Ratio	-----	-----	-----	-----	-----	>7.8	-----	-----	-----	1	-----	2.3	-----	-----	-----	2
Bank Height Ratio	-----	-----	-----	-----	-----	1.8	-----	-----	-----	1	-----	1.0	-----	-----	-----	2
d50 (mm)	-----	-----	-----	-----	-----	14.0	-----	-----	-----	-----	-----	3.0	-----	-----	-----	1
Pattern																
Channel Beltwidth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rc:Bankfull width (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Width Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Profile																
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	-----	-----	-----	-----	0.01	-----	-----	0.04	-----	-----	0.01	-----	-----	0.02	-----	2
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	-----	-----	-----	-----	46.0	-----	-----	98.0	-----	-----	146.0	-----	-----	-----	-----	2
Pool Max Depth (ft)	-----	-----	-----	-----	-----	3.8	-----	-----	-----	-----	4.1	-----	-----	-----	-----	1
Pool Volume (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----			<0.063 / 6 / 14 / 100 / 300						N/A / 1.2 / 3 / 77 / 800			
Reach Shear Stress (competency) lb/ft	-----	-----	-----	-----	-----	0.88	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Max part size (mm) mobilized at bankfull (Rosgen Curve)	-----	-----	-----	-----	-----	250.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters																
Drainage Area (SM)	-----	-----	-----	-----	2.3	-----	-----	2.9	-----	-----	-----	-----	-----	8.4	-----	-----
Impervious cover estimate (%)	-----	-----	-----	-----		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	-----	-----	-----	-----	E4/1	-----	-----	-----	-----	-----	C4	-----	-----	-----	-----
BF Velocity (fps)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	6.6	-----	-----	-----	-----
BF Discharge (cfs)	-----	58.0	450.0	189.7	-----	-----	-----	-----	-----	-----	-----	524.0	-----	-----	-----	-----
Valley Length	-----	-----	-----	-----		350.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel length (ft)	-----	-----	-----	-----	-----	350.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sinuosity	-----	-----	-----	-----	-----	1.00	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	-----	-----	-----		0.0080	-----	-----	-----	-----	-----	0.0070	-----	-----	-----	-----
BF slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Bankfull Floodplain Area (acres)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Table 7. Baseline Stream Summary
Big Cedar Creek Restoration Site Contract No. D06054-D
BCC Reach 1 (603 LF)

Parameter	Design						As-built						Year 1					
Dimension and Substrate - Riffle	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
BF Width (ft)	-----	20.0	-----	-----	-----	1	-----	19.6	-----	-----	-----	1	-----	19.5	-----	-----	-----	1
Floodprone Width (ft)	-----	87.0	-----	-----	-----	1	-----	65.3	-----	-----	-----	1	-----	65.2	-----	-----	-----	1
BF Mean Depth (ft)	-----	2.0	-----	-----	-----	1	-----	1.9	-----	-----	-----	1	-----	1.8	-----	-----	-----	1
BF Max Depth (ft)	-----	2.8	-----	-----	-----	1	-----	2.7	-----	-----	-----	1	-----	2.6	-----	-----	-----	1
BF Cross-sectional Area (ft^2)	-----	39.0	-----	-----	-----	1	-----	37.0	-----	-----	-----	1	-----	35.6	-----	-----	-----	1
Width/Depth Ratio	-----	10.0	-----	-----	-----	1	-----	10.4	-----	-----	-----	1	-----	10.7	-----	-----	-----	1
Entrenchment Ratio	-----	4.4	-----	-----	-----	1	-----	3.3	-----	-----	-----	1	-----	3.3	-----	-----	-----	1
Bank Height Ratio	-----	1.0	-----	-----	-----	1	-----	1.0	-----	-----	-----	1	-----	1.0	-----	-----	-----	1
d50 (mm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	26.0	-----	-----	-----	1.0
Pattern																		
Channel Beltwidth (ft)	103.0	-----	-----	132.0	-----	3	106.6	116.1	109.8	132.0	13.8	3	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	50.0	-----	-----	70.0	-----	3	48.0	59.7	61.0	70.0	11.1	3	-----	-----	-----	-----	-----	-----
Rc:Bankfull width (ft/ft)	2.5	-----	-----	3.5	-----	3	2.5	3.0	-----	3.6	-----	3	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	281.0	-----	-----	285.0	-----	2	251.7	272.8	257.2	309.4	31.8	3	-----	-----	-----	-----	-----	-----
Meander Width Ratio	5.2	-----	-----	6.6	-----	3	5.4	-----	-----	6.7	-----	3	-----	-----	-----	-----	-----	-----
Profile																		
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	52.0	69.0	73.0	83.0	12.9	3	59	66	66	72	-----	2
Riffle Slope (ft/ft)	0.0073	-----	-----	0.0079	-----	4	0.003	0.005	0.006	0.007	0.002	3	0.005	0.007	0.007	0.008	-----	2
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	150.0	-----	-----	205.0	-----	4	128.0	172.0	155.0	232.0	44.0	3	-----	127.0	-----	-----	-----	1
Pool Max Depth (ft)	-----	6.5	-----	-----	-----	1	-----	3.9	-----	-----	-----	-----	-----	3.8	-----	-----	-----	1
Pool Volume (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																		
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----			6 / 18 / 26 / 63 / 120			
Reach Shear Stress (competency) lb/ft²	-----	0.31	-----	-----	-----	-----	-----	0.2	-----	-----	-----	1	-----	0.2	-----	-----	-----	1
Max part size (mm) mobilized at bankfull (Rosgen Curve)	-----	80.0	-----	-----	-----	-----	-----	53.0	-----	-----	-----	1	-----	53.0	-----	-----	-----	1
Stream Power (transport capacity) W/m²	-----	-----	-----	-----	-----	-----	-----	11.6	-----	-----	-----	1	-----	11.8	-----	-----	-----	1
Additional Reach Parameters																		
Drainage Area (SM)	2.3	-----	-----	2.3	-----	-----	2.3	-----	-----	2.3	-----	-----	2.3	-----	-----	2.3	-----	-----
Impervious cover estimate (%)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	E/C4	-----	-----	-----	-----	-----	E/C	-----	-----	-----	-----	-----	E/C	-----	-----	-----	-----
BF Velocity (fps)	-----	3.8	-----	-----	-----	-----	-----	4.1	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Discharge (cfs)	-----	150.0	-----	-----	-----	-----	-----	150.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valley Length	-----	-----	-----	-----	-----	-----	-----	460.0	-----	-----	-----	-----	-----		-----	-----	-----	-----
Channel length (ft)	-----	573.0	-----	-----	-----	-----	-----	603.0	-----	-----	-----	-----	-----	337.0	-----	-----	-----	-----
Sinuosity	-----	1.30	-----	-----	-----	-----	-----	1.31	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	0.0030	-----	-----	-----	-----	-----	0.002	-----	-----	-----	-----	-----	0.002	-----	-----	-----	-----
BF slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Bankfull Floodplain Area (acres)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Table 7. Baseline Stream Summary
Big Cedar Creek Restoration Site Contract No. D06054-D
BCC Reach 2 (2239 LF)

Parameter	USGS Gauge	Regional Curve Interval			Pre-Existing Condition						Reference Reach(es) Data Morgan Creek					
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																
BF Width (ft)	-----	12.0	39.0	18.8	-----	22.0	-----	-----	-----	1.0	-----	33.2	-----	-----	-----	2
Floodprone Width (ft)		-----	-----	-----	-----	33.0	-----	-----	-----	1.0	-----	77.5	-----	-----	-----	2
BF Mean Depth (ft)	-----	1.4	3.3	2.1	-----	1.8	-----	-----	-----	1.0	-----	2.3	-----	-----	-----	2
BF Max Depth (ft)	-----	-----	-----	-----	-----	2.6	-----	-----	-----	1.0	-----	2.8	-----	-----	-----	2
BF Cross-sectional Area (ft²)	-----	23.0	85.0	44.3	-----	39.7	-----	-----	-----	1.0	-----	75.1	-----	-----	-----	2
Width/Depth Ratio	-----	-----	-----	-----	-----	12.2	-----	-----	-----	1.0	-----	14.1	-----	-----	-----	2
Entrenchment Ratio	-----	-----	-----	-----	-----	1.5	-----	-----	-----	1.0	-----	2.3	-----	-----	-----	2
Bank Height Ratio	-----	-----	-----	-----	-----	1.9	-----	-----	-----	1.0	-----	1.0	-----	-----	-----	2
d50 (mm)	-----	-----	-----	-----	-----	17.0	-----	-----	-----	1.0	-----	3.0	-----	-----	-----	1
Pattern																
Channel Beltwidth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rc:Bankfull width (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Width Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Profile																
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	-----	-----	-----	-----	0.0	-----	-----	0.0	-----	-----	0.01	-----	-----	0.02	-----	2
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	-----	-----	-----	-----	40.0	-----	-----	242.0	-----	-----	146.0	-----	-----	-----	-----	2
Pool Max Depth (ft)	-----	-----	-----	-----	-----	4.2	-----	-----	-----	-----	4.1	-----	-----	-----	-----	1
Pool Volume (ft³)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----			<0.063 / 8 / 17 /85 / 350						N/A / 1.2 / 3 / 77 / 800			
Reach Shear Stress (competency) lb/f	-----	-----	-----	-----	-----	0.7	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Max part size (mm) mobilized at bankfull (Rosgen Curve	-----	-----	-----	-----	-----	190.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters																
Drainage Area (SM)	-----	-----	-----	-----	2.9	-----	-----	2.9	-----	-----	-----	-----	-----	8.4	-----	-----
Impervious cover estimate (%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	-----	-----	-----	-----	B4/1c	-----	-----	-----	-----	-----	C4	-----	-----	-----	-----
BF Velocity (fps)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	6.6	-----	-----	-----	-----
BF Discharge (cfs)	-----	72.0	530.0	192.6	-----	-----	-----	-----	-----	-----	-----	524.0	-----	-----	-----	-----
Valley Length (ft)	-----	-----	-----	-----	-----	1016.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel length (ft)	-----	-----	-----	-----	-----	1016.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sinuosity	-----	-----	-----	-----	-----	1.00	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	-----	-----	-----	-----	0.0077	-----	-----	-----	-----	-----	0.0070	-----	-----	-----	-----
BF slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Bankfull Floodplain Area (acres	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Table 7. Baseline Stream Summary
Big Cedar Creek Restoration Site Contract No. D06054-D
BCC Reach 2 (2239 LF)

Parameter	Design						As-built						Year 1					
Dimension and Substrate - Riffle	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
BF Width (ft)	-----	23	-----	-----	-----	1	22.5	23.9	23.4	25.7	1.3	3	22.3	23.3	22.5	25.2	1.6	3
Floodprone Width (ft)	-----	100.0	-----	-----	-----	1	74.4	74.9	74.5	75.8	0.7	3	74.3	74.8	74.5	75.7	0.8	3
BF Mean Depth (ft)	-----	2.3	-----	-----	-----	1	2.2	2.4	2.4	2.5	0.1	3	2.3	2.5	2.5	2.6	0.2	3
BF Max Depth (ft)	-----	3.3	-----	-----	-----	1	3.3	3.6	3.5	3.9	0.2	3	3.8	4.0	4.1	4.2	0.2	3
BF Cross-sectional Area (ft^2)	-----	52.7	-----	-----	-----	1	49.7	56.6	56.9	63.1	5.5	3	56.2	57.6	57.6	59.0	1.4	3
Width/Depth Ratio	-----	10.0	-----	-----	-----	1	9.6	10.1	10.2	10.4	0.3	3	8.7	9.5	9.0	10.8	1.1	3
Entrenchment Ratio	-----	4.3	-----	-----	-----	1	3.0	3.2	3.2	3.3	0.1	3	3.0	3.2	3.3	3.3	0.2	3
Bank Height Ratio	-----	1.0	-----	-----	-----	1	1.0	1.0	1.0	1.0	0.0	3	1.0	1.0	1.0	1.0	0.0	3
d50 (mm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	22.6	-----	-----	-----	1
Pattern																		
Channel Beltwidth (ft)	73.0	-----	-----	144.0	-----	14	72.4	99.2	99.7	144.0	18.9	14	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	44.0	-----	-----	77.0	-----	15	37.0	52.7	47.0	89.0	14.2	15	-----	-----	-----	-----	-----	-----
Rc:Bankfull width (ft/ft)	1.9	-----	-----	3.3	-----	15	1.6	2.2	-----	3.8	-----	15	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	197.0	-----	-----	312.0	-----	13	184.9	229.4	216.6	297.5	33.1	14	-----	-----	-----	-----	-----	-----
Meander Width Ratio	3.2	-----	-----	6.3	-----	14	3.0	-----	-----	6.0	-----	14	-----	-----	-----	-----	-----	-----
Profile																		
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	41.0	62.0	59.0	102.0	18.5	15	-----	-----	-----	38	-----	1
Riffle Slope (ft/ft)	0.0092	-----	-----	0.0144	-----	15	0.0070	0.0110	0.0110	0.0170	0.0030	15	0.013	0.016	0.016	0.020	-----	1
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	110.0	-----	-----	223.0	-----	15	101.0	135.0	150.0	225.0	39.2	15	-----	-----	-----	-----	-----	-----
Pool Max Depth (ft)	-----	5.2	-----	-----	-----	1	5.5	-----	-----	5.5	-----	2	5.2	-----	-----	5.7	-----	2
Pool Volume (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																		
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----			<0.063 / 10 / 22.6 / 80 / 150			
Reach Shear Stress (competency) lb/f	-----	0.6	-----	-----	-----	-----	-----	0.62	-----	-----	-----	1	-----	1	-----	-----	-----	1
Max part size (mm) mobilized at bankfull (Rosgen Curve	-----	150.0	-----	-----	-----	-----	-----	170.0	-----	-----	-----	1	-----	200.0	-----	-----	-----	1
Stream Power (transport capacity) W/m	-----	-----	-----	-----	-----	-----	-----	29.3	-----	-----	-----	1	-----	38.6	-----	-----	-----	1
Additional Reach Parameters																		
Drainage Area (SM)	2.3	-----	-----	3.1	-----	-----	2.3	-----	-----	3.1	-----	-----	2.3	-----	-----	3.1	-----	-----
Impervious cover estimate (%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	E/C4	-----	-----	-----	-----	-----	E/C	-----	-----	-----	-----	-----	E/C	-----	-----	-----	-----
BF Velocity (fps)	-----	3.5	-----	-----	-----	-----	-----	3.3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Discharge (cfs)	-----	185.0	-----	-----	-----	-----	-----	185.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valley Length	-----	1723.0	-----	-----	-----	-----	-----	1694.0	-----	-----	-----	-----	-----		-----	-----	-----	-----
Channel length (ft)	-----	2240.0	-----	-----	-----	-----	-----	2220.0	-----	-----	-----	-----	-----	200.0	-----	-----	-----	-----
Sinuosity	-----	1.30	-----	-----	-----	-----	-----	1.31	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	0.0050	-----	-----	-----	-----	-----	0.0050	-----	-----	-----	-----	-----	0.0070	-----	-----	-----	-----
BF slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Bankfull Floodplain Area (acres	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Table 7. Baseline Stream Summary
Big Cedar Creek Restoration Site Contract No. D06054-D
BCC Reach 3 (1827 LF)

Parameter	USGS Gauge	Regional Curve Interval			Pre-Existing Condition						Reference Reach(es) Data Morgan Creek					
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Dimension - Riffle																
BF Width (ft)	-----	13.0	40.0	19.9	-----	19.5	-----	-----	-----	1	-----	33.2	-----	-----	-----	2
Floodprone Width (ft)	-----	-----	-----	-----	-----	>111.4	-----	-----	-----	1	-----	77.5	-----	-----	-----	2
BF Mean Depth (ft)	-----	1.4	3.5	2.2	-----	1.7	-----	-----	-----	1	-----	2.3	-----	-----	-----	2
BF Max Depth (ft)	-----	-----	-----	-----	-----	2.7	-----	-----	-----	1	-----	2.8	-----	-----	-----	2
BF Cross-sectional Area (ft²)	-----	25.0	90.0	48.3	-----	32.8	-----	-----	-----	1	-----	75.1	-----	-----	-----	2
Width/Depth Ratio	-----	-----	-----	-----	-----	11.5	-----	-----	-----	1	-----	14.1	-----	-----	-----	2
Entrenchment Ratio	-----	-----	-----	-----	-----	>5.7	-----	-----	-----	1	-----	2.3	-----	-----	-----	2
Bank Height Ratio	-----	-----	-----	-----	-----	1.6	-----	-----	-----	1	-----	1.0	-----	-----	-----	2
d50 (mm)	-----	-----	-----	-----	-----	17.0	-----	-----	-----	1	-----	3.0	-----	-----	-----	1
Pattern																
Channel Beltwidth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rc:Bankfull Width (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Width Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Profile																
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	-----	-----	-----	-----	0.0100	-----	-----	0.0490	-----	-----	0.0140	-----	-----	0.0240	-----	2
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	-----	-----	-----	-----	59.0	-----	-----	242.0	-----	-----	146.0	-----	-----	-----	-----	2
Pool Max Depth (ft)	-----	-----	-----	-----	-----	3.3	-----	-----	-----	-----	4.1	-----	-----	-----	-----	1
Pool Volume (ft³)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----			<0.063 / 8 / 17 / 85 / 350						N/A / 1.2 / 3 / 77 / 800			
Reach Shear Stress (competency) lb/f	-----	-----	-----	-----	-----	0.4	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Max part size (mm) mobilized at bankfull (Rosgen Curve)	-----	-----	-----	-----	-----	100.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters																
Drainage Area (SM)	-----	-----	-----	-----	2.9	-----	-----	3.3	-----	-----	-----	-----	-----	8.4	-----	-----
Impervious cover estimate (%)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	-----	-----	-----	-----	C4/1	-----	-----	-----	-----	-----	C4	-----	-----	-----	-----
BF Velocity (fps)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	6.6	-----	-----	-----	-----
BF Discharge (cfs)	-----	68.0	590.0	210.9	-----	-----	-----	-----	-----	-----	-----	524.0	-----	-----	-----	-----
Valley Length (ft)	-----	-----	-----	-----	-----	1860.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel length (ft)	-----	-----	-----	-----	-----	2046.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sinuosity	-----	-----	-----	-----	-----	1.10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	-----	-----	-----	-----	0.0045	-----	-----	-----	-----	-----	0.0070	-----	-----	-----	-----
BF Slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Banfull Floodplain Area (Acres)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Table 7. Baseline Stream Summary
Big Cedar Creek Restoration Site Contract No. D06054-D
BCC Reach 3 (1827 LF)

Parameter	Design						As-built						Year 1					
Dimension and Substrate - Riffle	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
BF Width (ft)	-----	24.4	-----	-----	-----	1	23.1	24.5	24.6	25.7	1.1	3	22.3	23.4	23.1	24.9		3
Floodprone Width (ft)	-----	100+	-----	-----	-----	1	77.8	79.5	77.9	82.9	2.4	3	77.8	79.6	78.0	82.9		3
BF Mean Depth (ft)	-----	2.1	-----	-----	-----	1	2.1	2.2	2.2	2.2	0.0	3	2.2	2.3	2.3	2.4		3
BF Max Depth (ft)	-----	3.0	-----	-----	-----	1	3.1	3.2	3.1	3.3	0.1	3	3.1	3.3	3.1	3.7		3
BF Cross-sectional Area (ft^2)	-----	52.1	-----	-----	-----	1	50.1	52.7	51.8	56.2	2.6	3	50.5	53.9	50.8	60.4		3
Width/Depth Ratio	-----	11.6	-----	-----	-----	1	10.7	11.4	11.7	11.8	0.5	3	9.8	10.2	10.3	10.5		3
Entrenchment Ratio	-----	4.1+	-----	-----	-----	1	3.2	3.3	3.2	3.4	0.1	3	3.3	3.4	3.4	3.5		3
Bank Height Ratio	-----	1.0	-----	-----	-----	1	1.0	1.0	1.0	1.0	0.0	3	1.0	1.0	1.0	1.0	0.0	3
d50 (mm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	59.0	-----	-----	-----	1.0
Pattern																		
Channel Beltwidth (ft)	52.0	-----	-----	114.0	-----	12	50.0	76.8	79.5	103.0	14.3	12	45.0	65.3	63.0	88.0	16.6	5
Radius of Curvature (ft)	44.0	-----	-----	83.0	-----	13	40.0	57.2	50.0	103.0	17.6	13	51.0	66.0	71.0	79.0	11.3	7
Rc:Bankfull width (ft/ft)	1.8	-----	-----	3.4	-----	13	1.6	-----	-----	4.2	-----	13	2.2	-----	-----	3.4	-----	7
Meander Wavelength (ft)	187.0	-----	-----	313.0	-----	11	176.5	240.0	247.6	285.0	35.6	13	176.0	236.0	236.0	291.0	53.5	5
Meander Width Ratio	2.1	-----	-----	4.7	-----	12	2.0	-----	-----	4.2	-----	12	1.9	-----	-----	3.8	-----	5
Profile																		
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	37	70	66	127	25	12	35	68	72	97	21	6
Riffle Slope (ft/ft)	0.0080	-----	-----	0.0169	-----	13	0.0020	0.0130	0.0110	0.0310	0.0076	13	0.009	0.016	0.017	0.025	0.010	6
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	83.0	-----	-----	185.0	-----	13	87.0	140.0	141.0	183.0	26.4	13	90.0	130.0	128.0	130.0	32.0	6
Pool Max Depth (ft)	-----	5.2	-----	-----	-----	1	-----	5.4	-----	-----	-----	1	-----	5.2	-----	-----	-----	1
Pool Volume (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																		
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----			33 / 47 / 59 / 102 / 130			
Reach Shear Stress (competency) lb/f	-----	0.8	-----	-----	-----	-----	-----	0.68	-----	-----	-----	1	-----	1.1	-----	-----	-----	1
Max part size (mm) mobilized at bankfull (Rosgen Curve	-----	190.0	-----	-----	-----	-----	-----	180	-----	-----	-----	1	-----	225	-----	-----	-----	1
Stream Power (transport capacity) W/m	-----	-----	-----	-----	-----	-----	-----	36.8	-----	-----	-----	1	-----	51.2	-----	-----	-----	1
Additional Reach Parameters																		
Drainage Area (SM)	3.1	-----	-----	3.3	-----	-----	3.1	-----	-----	3.32	-----	-----	3.1	-----	-----	3.32	-----	-----
Impervious cover estimate (%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	E/C4	-----	-----	-----	N/A	-----	E/C	-----	-----	-----	-----	-----	E/C	-----	-----	-----	-----
BF Velocity (fps)	-----	3.7	-----	-----	-----	-----	-----	3.7	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Discharge (cfs)	-----	195.0	-----	-----	-----	N/A	-----	195.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valley Length	-----	-----	-----	-----	-----	-----	-----	1558.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel length (ft)	-----	1809.0	-----	-----	-----	-----	-----	1823.0	-----	-----	-----	-----	-----	1030.0	-----	-----	-----	-----
Sinuosity	-----	1.10	-----	-----	-----	-----	-----	1.17	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	0.0077	-----	-----	-----	-----	-----	0.0060	-----	-----	-----	-----	-----	0.0080	-----	-----	-----	-----
BF slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Bankfull Floodplain Area (acres	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Table 7. Baseline Stream Summary
Big Cedar Creek Restoration Site Contract No. D06054-D
BCC Reach 4 (410 LF)

Parameter	USGS Gauge	Regional Curve Interval			Pre-Existing Condition						Reference Reach(es) Data Morgan Creek					
Dimension - Riffle		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
BF Width (ft)	-----	13.0	40.0	20.0	-----	29.6	-----	-----	-----	-----	-----	33.2	-----	-----	-----	2
Floodprone Width (ft)	-----	-----	-----	-----	-----	>109.7	-----	-----	-----	-----	-----	77.5	-----	-----	-----	2
BF Mean Depth (ft)	-----	1.4	3.5	2.2	-----	1.6	-----	-----	-----	-----	-----	2.3	-----	-----	-----	2
BF Max Depth (ft)	-----	-----	-----	-----	-----	2.3	-----	-----	-----	-----	-----	2.8	-----	-----	-----	2
BF Cross-sectional Area (ft²)	-----	25.0	90.0	48.8	-----	47.1	-----	-----	-----	-----	-----	75.1	-----	-----	-----	2
Width/Depth Ratio	-----	-----	-----	-----	-----	18.5	-----	-----	-----	-----	-----	14.1	-----	-----	-----	2
Entrenchment Ratio	-----	-----	-----	-----	-----	>3.7	-----	-----	-----	-----	-----	2.3	-----	-----	-----	2
Bank Height Ratio	-----	-----	-----	-----	-----	1.6	-----	-----	-----	-----	-----	1.0	-----	-----	-----	2
d50 (mm)	-----	-----	-----	-----	-----	17	-----	-----	-----	-----	-----	3.0	-----	-----	-----	1
Pattern																
Channel Beltwidth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rc:Bankfull Width (ft/ft)	-----	-----	-----	-----			-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Width Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Profile																
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	-----	-----	-----	-----	0.0138	-----	-----	0.0498	-----	-----	0.0140	-----	-----	0.0240	-----	2
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	-----	-----	-----	-----	20.0	-----	-----	236.0	-----	-----	146.0	-----	-----	-----	-----	2
Pool Max Depth (ft)	-----	-----	-----	-----	-----	3.4	-----	-----	-----	-----	4.1	-----	-----	-----	-----	1
Pool Volume (ft³)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----			<0.063 / 5 / 17 / 120 / >2048						N/A / 1.2 / 3 / 77 / 800			
Reach Shear Stress (competency) lb/f	-----	-----	-----	-----	-----	0.8	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Max Part Size (mm) mobilized at bankfull (Rosgen Curve	-----	-----	-----	-----	-----	200.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters																
Drainage Area (SM)	-----	-----	-----	-----	3.3	-----	-----	3.4	-----	-----	-----	-----	-----	8.4	-----	-----
Impervious cover estimate (acres	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	-----	-----	-----	-----	C4/1	-----	-----	-----	-----	-----	C4	-----	-----	-----	-----
Bankfull Velocity (fps)	-----	-----	-----	-----	-----	1.6	-----	-----	-----	-----	-----	6.6	-----	-----	-----	-----
BF Discharge (cfs)	-----	68.0	590.0	213.2	-----		-----	-----	-----	-----	-----	524.0	-----	-----	-----	-----
Valley Length (ft)	-----	-----	-----	-----	-----	887.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel length (ft)	-----	-----	-----	-----	-----	976.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sinuosity	-----	-----	-----	-----	-----	1.10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	-----	-----	-----	-----	0.0090	-----	-----	-----	-----	-----	0.0070	-----	-----	-----	-----
BF slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Bankfull Floodplain Area (acres	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stablibity or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Table 7. Baseline Stream Summary
Big Cedar Creek Restoration Site Contract No. D06054-D
BCC Reach 4 (410 LF)

Parameter	Design						As-built						Year 1					
Dimension and Substrate - Riffle	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
BF Width (ft)	-----	26.0	-----	-----	-----	1	-----	27.5	-----	-----	-----	1	-----	27.8	-----	-----	-----	1
Floodprone Width (ft)	-----	94.0	-----	-----	-----	1	-----	81.0	-----	-----	-----	1	-----	81.1	-----	-----	-----	1
BF Mean Depth (ft)	-----	2.2	-----	-----	-----	1	-----	2.1	-----	-----	-----	1	-----	2.3	-----	-----	-----	1
BF Max Depth (ft)	-----	3.0	-----	-----	-----	1	-----	3.2	-----	-----	-----	1	-----	3.7	-----	-----	-----	1
BF Cross-sectional Area (ft^2)	-----	57.2	-----	-----	-----	1	-----	58.3	-----	-----	-----	1	-----	62.6	-----	-----	-----	1
Width/Depth Ratio	-----	11.8	-----	-----	-----	1	-----	13.0	-----	-----	-----	1	-----	12.4	-----	-----	-----	1
Entrenchment Ratio	-----	3.6	-----	-----	-----	1	-----	3.0	-----	-----	-----	1	-----	2.9	-----	-----	-----	1
Bank Height Ratio	-----	1.0	-----	-----	-----	1	-----	1.0	-----	-----	-----	1	-----	1.0	-----	-----	-----	1
d50 (mm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pattern																		
Channel Beltwidth (ft)	58.0	-----	-----	91.0	-----	3	57.0	89.3	97.0	114.0	29.3	3	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	52.0	-----	-----	53.0	-----	3	27.0	46.0	51.0	60.0	17.1	3	-----	-----	-----	-----	-----	-----
Rc:Bankfull width (ft/ft)	2.0	-----	-----	2.0	-----	3	1.0	-----	-----	2.2	-----	3	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	207.0	-----	-----	247.0	-----	2	224.3	236.6	236.6	248.9	17.4	2	-----	-----	-----	-----	-----	-----
Meander Width Ratio	2.2	-----	-----	3.5	-----	3	2.1	-----	-----	4.2	-----	-----	-----	-----	-----	-----	-----	-----
Profile																		
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	43.0	66.5	67.0	89.0	18.0	4	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	0.0119	-----	-----	0.0237	-----	4	0.0120	0.0140	0.0140	0.0160	0.0020	4	-----	-----	-----	-----	-----	-----
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	105.0	-----	-----	112.0	-----	2	118.0	122.0	122.0	126.0	-----	2	-----	-----	-----	-----	-----	-----
Pool Max Depth (ft)	-----	5.0	-----	-----	-----	1	-----	4.7	-----	-----	-----	1	-----	4.3	-----	-----	-----	1
Pool Volume (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																		
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Reach Shear Stress (competency) lb/f	-----	1.2	-----	-----	-----	-----	-----	1.1	-----	-----	-----	1	-----	-----	-----	-----	-----	-----
Max part size (mm) mobilized at bankfull (Rosgen Curve	-----	275.0	-----	-----	-----	-----	-----	260.0	-----	-----	-----	1	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m	-----	-----	-----	-----	-----	-----	-----	53.6	-----	-----	-----	1	-----	-----	-----	-----	-----	-----
Additional Reach Parameters																		
Drainage Area (SM)	3.3	-----	-----	3.4	-----	-----	3.3	-----	-----	3.4	-----	-----	3.3	-----	-----	3.4	-----	-----
Impervious cover estimate (%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	E/C4	-----	-----	-----	-----	-----	E/C	-----	-----	-----	-----	-----	E/C	-----	-----	-----	-----
BF Velocity (fps)	-----	3.5	-----	-----	-----	-----	-----	3.4	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Discharge (cfs)	-----	199.0	-----	-----	-----	-----	-----	199.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valley Length	-----	-----	-----	-----	-----	-----	-----	350.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel length (ft)	-----	400.0	-----	-----	-----	-----	-----	410.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sinuosity	-----	1.10	-----	-----	-----	-----	-----	1.17	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	0.0098	-----	-----	-----	-----	-----	0.0094	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Bankfull Floodplain Area (acres	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Table 7. Baseline Stream Summary
Big Cedar Creek Restoration Site Contract No. D06054-D
UT1 Reach 1 (1248 LF)

Parameter	USGS Gauge	Regional Curve Interval			Pre-Existing Condition						Reference Reach(es) Data Spencer Creek					
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																
BF Width (ft)	-----	7.0	26.0	11.5	-----	18.9	-----	-----	-----	1	-----	8.7	-----	-----	-----	1
Floodprone Width (ft)	-----	-----	-----	-----	-----	>135.3	-----	-----	-----	1	-----	228.5	-----	-----	-----	1
BF Mean Depth (ft)	-----	0.9	2.4	1.5	-----	0.8	-----	-----	-----	1	-----	1.2	-----	-----	-----	1
BF Max Depth (ft)	-----	-----	-----	-----	-----	1.8	-----	-----	-----	1	-----	1.9	-----	-----	-----	1
BF Cross-sectional Area (ft^2)	-----	10.0	38.0	20.4	-----	14.4	-----	-----	-----	1	-----	10.6	-----	-----	-----	1
Width/Depth Ratio	-----	-----	-----	-----	-----	23.6	-----	-----	-----	1	-----	7.3	-----	-----	-----	1
Entrenchment Ratio	-----	-----	-----	-----	-----	>7.2	-----	-----	-----	1	-----	26.3	-----	-----	-----	1
Bank Height Ratio	-----	-----	-----	-----	-----	1.6	-----	-----	-----	1	-----	1.0	-----	-----	-----	1
d50 (mm)	-----	-----	-----	-----	-----	18.0	-----	-----	-----	1	-----	8.6	-----	-----	-----	-----
Pattern																
Channel Beltwidth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	24.0	-----	-----	52.0	-----	2
Radius of Curvature (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	5.4	-----	-----	22.1	-----	5
Rc:Bankfull Width (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.6	-----	-----	2.5	-----	5
Meander Wavelength (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	54.0	-----	-----	196.0	-----	2
Meander Width Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.8	-----	-----	6.0	-----	2
Profile																
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	-----	-----	-----	-----	0.0180	-----	-----	0.1530	-----	2	0.010	-----	-----	0.067	-----	2
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Pool Spacing (ft)	-----	-----	-----	-----	9.9	-----	-----	182	-----	-----	13.0	-----	-----	46.5	-----	5
Pool Max Depth (ft)	-----	-----	-----	-----	-----	2.2	-----	-----	-----	-----	-----	2.5	-----	-----	-----	1
Pool Volume (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----			<0.063 / 7 / 18 / 149 / >2048						0.06 / 3 / 8.6 / 77 / 180			
Reach Shear Stress (competency) lb/f	-----	-----	-----	-----	-----	0.5	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Max part size (mm) mobilized at bankfull (Rosgen Curve	-----	-----	-----	-----	-----	125.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters																
Drainage Area (SM)	-----	-----	-----	-----	0.7	-----	-----	0.9	-----	-----	-----	-----	-----	0.5	-----	-----
Impervious cover estimate (%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	-----	-----	-----	-----	C4/1	-----	-----	-----	-----	-----	E4/C4	-----	-----	-----	-----
BF Velocity (fps)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Discharge (cfs)	-----	30.0	235.0	84.5	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valley Length (ft)	-----	-----	-----	-----	-----	1,816.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel length (ft)	-----	-----	-----	-----	-----	1,998.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sinuosity	-----	-----	-----	-----	-----	1.10	-----	-----	-----	-----	-----	1.10	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	-----	-----	-----	-----	0.0116	-----	-----	-----	-----	-----	0.0132	-----	-----	-----	-----
BF Slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Bankfull Floodplain Area (acres	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Table 7. Baseline Stream Summary
Big Cedar Creek Restoration Site Contract No. D06054-D
UT1 Reach 1 (1248 LF)

Parameter	Design						As-built						Year 1					
Dimension and Substrate - Riffle	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
BF Width (ft)	-----	13.0	-----	-----	-----	1	11.6	13.2	13.2	14.7	1.3	3	12.0	12.8	12.8	13.7	0.9	3
Floodprone Width (ft)	-----	73.8	-----	-----	-----	1	48.4	52.8	53.6	56.5	3.3	3	48.5	52.8	53.5	56.4	4.0	3
BF Mean Depth (ft)	-----	1.2	-----	-----	-----	1	1.0	1.1	1.1	1.3	0.1	3	1.0	1.1	1.1	1.3	0.2	3
BF Max Depth (ft)	-----	1.7	-----	-----	-----	1	1.7	1.9	1.8	2.1	0.2	3	1.6	1.8	1.7	2.2	0.3	3
BF Cross-sectional Area (ft^2)	-----	15.3	-----	-----	-----	1	14.2	14.9	15.2	15.2	0.5	3	13.6	14.5	13.7	16.1	1.4	3
Width/Depth Ratio	-----	10.8	-----	-----	-----	1	8.8	11.8	12.3	14.2	2.2	3	9.0	11.6	12.1	13.7	2.4	3
Entrenchment Ratio	-----	5.7	-----	-----	-----	1	3.9	4.0	4.0	4.2	0.1	3	4.0	4.1	4.0	4.2	0.1	3
Bank Height Ratio	-----	1.0	-----	-----	-----	1	1.0	1.0	1.0	1.0	1.0	3	1.0	1.0	1.0	1.0	1.0	3
d50 (mm)	-----	-----	-----	-----	-----	-----	-----	39.0	-----	-----	-----	1	-----	62.0	-----	-----	-----	1
Pattern																		
Channel Beltwidth (ft)	29.0	-----	-----	64.0	-----	13	42.0	65.6	67.0	75.0	10.2	13	48.0	68.0	69.5	78.0	9.3	8
Radius of Curvature (ft)	28.0	-----	-----	40.0	-----	14	22.0	32.4	33.0	41.0	5.2	14	29.0	32.5	32.5	39.0	3.2	8
Rc:Bankfull width (ft/ft)	-----	-----	-----	-----	-----	-----	1.7	-----	-----	3.1	-----	1	2.3	-----	-----	3.1	-----	8
Meander Wavelength (ft)	140.0	-----	-----	157.0	-----	12	111.3	151.9	150.7	174.0	15.9	12	150.0	156.6	157.0	166.0	5.4	7
Meander Width Ratio	2.2	-----	-----	4.9	-----	13	3.2	-----	-----	5.7	-----	13	3.8	-----	-----	6.1	-----	8
Profile																		
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	29.0	47.0	46.0	78.0	15.0	14	30.0	43.0	44.0	64.0	11.0	9
Riffle Slope (ft/ft)	0.0115	-----	-----	0.0230	-----	14	0.0000	0.0110	0.0120	0.0270	0.0081	14	0.0030	0.0220	0.0220	0.0370	0.0110	9
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	63.0	-----	-----	115.0	-----	13	61.0	95.0	102.0	113.0	17.0	13	70.0	102.0	104.0	128.0	22.0	9
Pool Max Depth (ft)	-----	-----	-----	-----	-----	-----	2.3	-----	-----	2.9	-----	2	2.2	-----	-----	2.7	-----	2
Pool Volume (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																		
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----	-----	-----			12 / 24 / 39 / 110 / 160						20 / 40 / 62 / 110 / 150			
Reach Shear Stress (competency) lb/f	-----	0.5	-----	-----	-----	-----	-----	0.4	-----	-----	-----	1	-----	0.5	-----	-----	-----	1
Max part size (mm) mobilized at bankfull (Rosgen Curve	-----	125.0	-----	-----	-----	-----	-----	95.0	-----	-----	-----	1	-----	130.0	-----	-----	-----	1
Stream Power (transport capacity) W/m	-----	-----	-----	-----	-----	-----	-----	24.4	-----	-----	-----	1	-----	33.4	-----	-----	-----	1
Additional Reach Parameters																		
Drainage Area (SM)	0.7	-----	-----	0.8	-----	-----	0.7	-----	-----	0.8	-----	-----	0.7	-----	-----	0.8	-----	-----
Impervious cover estimate (%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	E/C4	-----	-----	-----	-----	-----	E/C	-----	-----	-----	-----	-----	E/C	-----	-----	-----	-----
BF Velocity (fps)	-----	4.5	-----	-----	-----	-----	-----	4.6	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Discharge (cfs)	-----	69.0	-----	-----	-----	-----	-----	69.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valley Length	-----	-----	-----	-----	-----	-----	-----	959.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel length (ft)	-----	1276.0	-----	-----	-----	-----	-----	1247.0	-----	-----	-----	-----	-----	918.0	-----	-----	-----	-----
Sinuosity	-----	1.30	-----	-----	-----	-----	-----	1.30	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	0.0080	-----	-----	-----	-----	-----	0.0060	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.014	-----	-----	-----	-----
Bankfull Floodplain Area (acres	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Table 7. Baseline Stream Summary
Big Cedar Creek Restoration Site Contract No. D06054-D
UT1 Reach 2 (1016)

Parameter	USGS Gauge	Regional Curve Interval			Pre-Existing Condition						Reference Reach(es) Data Spencer Creek					
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Dimension and Substrate- Riffle																
BF Width (ft)	-----	7.0	27.0	11.8	-----	13.1	-----	-----	-----	1	-----	8.7	-----	-----	-----	1
Floodprone Width (ft)	-----	-----	-----	-----	-----	48.8	-----	-----	-----	1	-----	228.5	-----	-----	-----	1
BF Mean Depth (ft)	-----	0.9	1.5	1.5	-----	1.4	-----	-----	-----	1	-----	1.2	-----	-----	-----	1
BF Max Depth (ft)	-----	-----	-----	-----	-----	2.2	-----	-----	-----	1	-----	1.9	-----	-----	-----	1
BF Cross-sectional Area (ft²)	-----	11.0	40.0	21.1	-----	18.5	-----	-----	-----	1	-----	10.6	-----	-----	-----	1
Width/Depth Ratio	-----	-----	-----	-----	-----	9.4	-----	-----	-----	1	-----	7.3	-----	-----	-----	1
Entrenchment Ratio	-----	-----	-----	-----	-----	3.7	-----	-----	-----	1	-----	26.3	-----	-----	-----	1
Bank Height Ratio	-----	-----	-----	-----	-----	2.1	-----	-----	-----	1	-----	1.0	-----	-----	-----	1
d50 (mm)	-----	-----	-----	-----	-----	40.0	-----	-----	-----	1	-----	8.6	-----	-----	-----	1
Pattern																
Channel Beltwidth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	24.0	-----	-----	52.0	-----	2
Radius of Curvature (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	5.4	-----	-----	22.1	-----	5
Rc:Bankfull Width (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.6	-----	-----	2.5	-----	5
Meander Wavelength (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	54.0	-----	-----	196.0	-----	2
Meander Width Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.8	-----	-----	6.0	-----	2
Profile																
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	-----	-----	-----	-----	0.0242	-----	-----	0.178	-----	2	0.0100	-----	-----	0.0670	-----	2
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Pool Spacing (ft)	-----	-----	-----	-----	9.8	-----	-----	118.2	-----	-----	13.0	-----	-----	46.5	-----	5
Pool Max Depth (ft)	-----	-----	-----	-----	-----	2.1	-----	-----	-----	-----	-----	2.5	-----	-----	-----	1
Pool Volume (ft³)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----		<0.063 / 11 / 40 / >2048 / >2048							0.06 / 3 / 8.6 / 77 / 180			
Reach Shear Stress (competency) lb/ft²	-----	-----	-----	-----	-----	1.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Max part size (mm) mobilized at bankfull (Rosgen Curve)	-----	-----	-----	-----	-----	250.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m²	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters																
Drainage Area (SM)	-----	-----	-----	-----	0.9	-----	-----	1.0	-----	-----	-----	-----	-----	0.5	-----	-----
Impervious cover estimate (%)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	-----	-----	-----	-----	E4/1	-----	-----	-----	-----	-----	E4/C4	-----	-----	-----	-----
BF Velocity (fps)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Discharge (cfs)	-----	30.0	260.0	87.7	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valley Length (ft)	-----	-----	-----	-----	-----	759.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel length (ft)	-----	-----	-----	-----	-----	759.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sinuosity	-----	-----	-----	-----	-----	1.00	-----	-----	-----	-----	-----	1.10	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	-----	-----	-----	-----	0.0140	-----	-----	-----	-----	-----	0.0132	-----	-----	-----	-----
BF Slope (ft/ft)	-----	-----	-----	-----	-----	0.0139	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Banfull Floodplain Area (Acres)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Table 7. Baseline Stream Summary
Big Cedar Creek Restoration Site Contract No. D06054-D
UT1 Reach 2 (1016)

Parameter	Design						As-built						Year 1					
Dimension and Substrate - Riffle	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
BF Width (ft)	-----	15.0	-----	-----	-----	1	13.4	14.4	14.1	15.9	1.1	3	12.5	14.0	14.3	15.1	1.3	3
Floodprone Width (ft)	-----	85.5	-----	-----	-----	1	56.4	58.4	58.8	60.2	1.6	3	56.3	58.4	58.9	60.1	1.9	3
BF Mean Depth (ft)	-----	4.5	-----	-----	-----	1	1.1	1.1	1.1	1.2	0.0	3	1.0	1.1	1.1	1.2	0.1	3
BF Max Depth (ft)	-----	1.5	-----	-----	-----	1	1.8	1.9	1.8	1.9	0.1	3	1.7	1.8	1.7	2.1	0.2	3
BF Cross-sectional Area (ft^2)	-----	16.8	-----	-----	-----	1	14.5	16.3	16.3	17.9	1.4	3	13.0	15.5	16.0	17.4	2.2	3
Width/Depth Ratio	-----	13.6	-----	-----	-----	1	12.1	12.8	12.4	14.0	0.9	3	11.8	12.7	12.0	14.2	1.3	3
Entrenchment Ratio	-----	5.7	-----	-----	-----	1	3.7	4.1	4.2	4.3	0.3	3	3.9	4.2	4.2	4.5	0.3	3
Bank Height Ratio	-----	1.0	-----	-----	-----	1	1.0	1.0	1.0	1.0	1.0	3	1.0	1.0	1.0	1.0	1.0	3
d50 (mm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pattern																		
Channel Beltwidth (ft)	30.0	-----	-----	45.0	-----	10	29.0	45.3	48.0	58.0	11.7	10	30.0	46.5	49.5	57.0	10.6	6
Radius of Curvature (ft)	30.0	-----	-----	48.0	-----	11	20.0	35.3	36.0	47.0	6.2	11	25.0	28.0	29.0	30.0	2.0	5
Rc:Bankfull width (ft/ft)	2.0	-----	-----	3.2	-----	11	1.4	-----	-----	3.3	-----	1	1.8	-----	-----	2.1	-----	2
Meander Wavelength (ft)	134.0	-----	-----	199.0	-----	9	68.6	145.1	146.3	222.4	44.6	11	166.0	184.8	186.0	199.0	13.6	5
Meander Width Ratio	2.0	-----	-----	3.0	-----	10	2.0	-----	-----	4.0	-----	1	2.1	-----	-----	4.1	-----	2
Profile																		
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	48.0	67.0	64.0	94.0	14.0	10	42	62	60	92	16	6
Riffle Slope (ft/ft)	0.01920	-----	-----	0.02800	-----	11	0.0080	0.0160	0.0170	0.0220	0.0045	10	0.021	0.024	0.025	0.032	0.004	6
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	62.0	-----	-----	140.0	-----	11	17.0	74.0	77.0	116.0	28.0	11	41	85	90	110	24	7
Pool Max Depth (ft)	-----	3.5	-----	-----	-----	1	-----	2.6	-----	-----	-----	1	-----	2.9	-----	-----	-----	1
Pool Volume (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																		
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Reach Shear Stress (competency) lb/f	-----	0.8	-----	-----	-----	-----	-----	0.8	-----	-----	-----	1	-----	1.0	-----	-----	-----	1
Max part size (mm) mobilized at bankfull (Rosgen Curve	-----	200.0	-----	-----	-----	-----	-----	200.0	-----	-----	-----	1	-----	215.0	-----	-----	-----	1
Stream Power (transport capacity) W/m	-----	-----	-----	-----	-----	-----	-----	54.1	-----	-----	-----	1	-----	59.7	-----	-----	-----	1
Additional Reach Parameters																		
Drainage Area (SM)	0.8	-----	-----	0.9	-----	-----	0.8	-----	-----	0.9	-----	-----	0.8	-----	-----	0.9	-----	-----
Impervious cover estimate (%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classificatior	-----	B4c	-----	-----	-----	-----	-----	E/C	-----	-----	-----	-----	-----	E/C	-----	-----	-----	-----
BF Velocity (fps)	-----	4.5	-----	-----	-----	-----	-----	4.7	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Discharge (cfs)	-----	76.0	-----	-----	-----	-----	-----	76.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valley Length	-----	-----	-----	-----	-----	-----	----	924.0	-----	-----	-----	-----	----	-----	-----	-----	-----	-----
Channel length (ft)	-----	1025.0	-----	-----	-----	-----	----	1016.0	-----	-----	-----	-----	----	740.0	-----	-----	-----	-----
Sinuosity	-----	1.00	-----	-----	-----	-----	----	1.10	-----	-----	-----	-----	----	-----	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	0.0128	-----	-----	-----	-----	----	0.0130	-----	-----	-----	-----	----	-----	-----	-----	-----	-----
BF slope (ft/ft)	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	----	0.014	-----	-----	-----	-----
Bankfull Floodplain Area (acres	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Table 7. Baseline Stream Summary
Big Cedar Creek Restoration Site Contract No. D06054-D
UT1 Reach 3 (1885 LF)

Parameter	USGS Gauge	Regional Curve Interval			Pre-Existing Condition						Reference Reach(es) Data Spencer Creek					
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																
BF Width (ft)	-----	7.5	27.0	12.8	-----	17.6	-----	-----	-----	1	-----	8.7	-----	-----	-----	1
Floodprone Width (ft)	-----	-----	-----	-----	-----	>115.2	-----	-----	-----	1	-----	228.5	-----	-----	-----	1
BF Mean Depth (ft)	-----	1.0	2.5	1.6	-----	1.2	-----	-----	-----	1	-----	1.2	-----	-----	-----	1
BF Max Depth (ft)	-----	-----	-----	-----	-----	2.4	-----	-----	-----	1	-----	1.9	-----	-----	-----	1
BF Cross-sectional Area (ft²)	-----	12.0	43.0	24.0	-----	20.9	-----	-----	-----	1	-----	10.6	-----	-----	-----	1
Width/Depth Ratio	-----	-----	-----	-----	-----	14.7	-----	-----	-----	1	-----	7.3	-----	-----	-----	1
Entrenchment Ratio	-----	-----	-----	-----	-----	>6.5	-----	-----	-----	1	-----	26.3	-----	-----	-----	1
Bank Height Ratio	-----	-----	-----	-----	-----	1.4	-----	-----	-----	1	-----	1.0	-----	-----	-----	1
d50 (mm)	-----	-----	-----	-----	-----	16.0	-----	-----	-----	1	-----	8.6	-----	-----	-----	-----
Pattern																
Channel Beltwidth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	24.0	-----	-----	52.0	-----	2
Radius of Curvature (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	5.4	-----	-----	22.1	-----	5
Rc:Bankfull Width (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.6	-----	-----	2.5	-----	5
Meander Wavelength (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	54.0	-----	-----	196.0	-----	2
Meander Width Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.8	-----	-----	6.0	-----	2
Profile																
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	-----	-----	-----	-----	0.0274	-----	-----	0.0628	-----	2	0.0100	-----	-----	0.0670	-----	2
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	-----	-----	-----	-----	27.2	-----	-----	539.5	-----	-----	13	-----	-----	46.5	-----	5
Pool Max Depth (ft)	-----	-----	-----	-----	-----	2.1	-----	-----	-----	-----	-----	2.5	-----	-----	-----	1
Pool Volume (ft³)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----			<0.063 / 8 / 16 / 110 / 1024						0.06 / 3 / 8.6 / 77 / 180			
Reach Shear Stress (competency) lb/f	-----	-----	-----	-----	-----	0.9	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Max part size (mm) mobilized at bankfull (Rosgen Curve	-----	-----	-----	-----	-----	225.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters																
Drainage Area (SM)	-----	-----	-----	-----	1.0	-----	-----	1.2	-----	-----	-----	-----	-----	0.5	-----	-----
Impervious cover estimate (%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	-----	-----	-----	-----	C4/1	-----	-----	-----	-----	-----	E4/C4	-----	-----	-----	-----
BF Velocity (fps)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Discharge (cfs)	-----	35.0	290.0	100.3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valley Length (ft)	-----	-----	-----	-----	-----	1518.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel length (ft)	-----	-----	-----	-----	-----	1518.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sinuosity	-----	-----	-----	-----	-----	1.00	-----	-----	-----	-----	-----	1.10	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	-----	-----	-----	-----	0.0134	-----	-----	-----	-----	-----	0.013	-----	-----	-----	-----
BF Slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Banfull Floodplain Area (Acres	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Table 7. Baseline Stream Summary
Big Cedar Creek Restoration Site Contract No. D06054-D
UT1 Reach 3 (1885 LF)

Parameter	Design						As-built						Year 1					
Dimension and Substrate - Riffle	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
BF Width (ft)	-----	15.0	-----	-----	-----	1	15.1	15.5	15.3	16.2	0.5	3	14.0	15.6	15.8	16.9	1.5	3
Floodprone Width (ft)	-----	85.2	-----	-----	-----	1	56.9	57.5	57.1	58.6	0.8	3	56.9	57.6	57.1	58.8	1.0	3
BF Mean Depth (ft)	-----	1.2	-----	-----	-----	1	1.2	1.2	1.2	1.3	0.1	3	1.1	1.2	1.1	1.3	0.1	3
BF Max Depth (ft)	-----	1.5	-----	-----	-----	1	1.7	1.9	1.8	2.2	0.2	3	1.6	1.9	1.7	2.3	0.4	3
BF Cross-sectional Area (ft^2)	-----	17.3	-----	-----	-----	1	17.8	18.9	17.9	21.0	1.5	3	15.0	18.3	17.8	22.0	3.5	3
Width/Depth Ratio	-----	12.5	-----	-----	-----	1	12.6	12.8	12.7	13.1	0.2	3	12.9	13.3	13.1	14.0	0.6	3
Entrenchment Ratio	-----	5.7	-----	-----	-----	1	3.6	3.7	3.7	3.8	0.1	3	3.4	3.6	3.6	3.7	0.2	3
Bank Height Ratio	-----	1.0	-----	-----	-----	1	1.0	1.0	1.0	1.0	0.0	3	1.0	1.0	1.0	1.0	0.0	3
d50 (mm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	37.0	-----	-----	-----	1
Pattern																		
Channel Beltwidth (ft)	22.0	-----	-----	65.0	-----	18	29.0	63.7	68.0	76.0	12.9	18	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	30.0	-----	-----	50.0	-----	19	29.0	38.4	37.0	52.0	6.8	19	-----	-----	-----	-----	-----	-----
Rc:Bankfull width (ft/ft)	2.0	-----	-----	3.3	-----	19	1.9	-----	-----	3.4	-----	1	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	127.0	-----	-----	198.0	-----	17	129.7	177.7	181.2	220.1	22.0	18	-----	-----	-----	-----	-----	-----
Meander Width Ratio	1.5	-----	-----	4.3	-----	18	1.9	-----	-----	4.9	-----	18	-----	-----	-----	-----	-----	-----
Profile																		
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	31.0	55.0	59.0	85.0	15.0	18	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	0.0175	-----	-----	0.0354	-----	19	0.0100	0.0220	0.0200	0.0390	0.008	18	-----	-----	-----	-----	-----	-----
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	61.0	-----	-----	137.0	-----	19	23.0	94.0	106.5	134.0	30.0	20	-----	-----	-----	-----	-----	-----
Pool Max Depth (ft)	-----	3.3	-----	-----	-----	1	3.0	-----	-----	3.0	-----	2	2.7	-----	-----	2.7	-----	2
Pool Volume (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																		
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----			11.3 / 21 / 37 / 120 / 180			
Reach Shear Stress (competency) lb/f	-----	0.7	-----	-----	-----	-----	-----	0.8	-----	-----	-----	1	-----	-----	-----	-----	-----	-----
Max part size (mm) mobilized at bankfull (Rosgen Curve	-----	190.0	-----	-----	-----	-----	-----	200.0	-----	-----	-----	1	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m	-----	-----	-----	-----	-----	-----	-----	57.9	-----	-----	-----	1	-----	-----	-----	-----	-----	-----
Additional Reach Parameters																		
Drainage Area (SM)	0.9	-----	-----	1.1	-----	-----	0.9	-----	-----	1.1	-----	-----	0.9	-----	-----	1.1	-----	-----
Impervious cover estimate (%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	C4	-----	-----	-----	-----	-----	E/C	-----	-----	-----	-----	-----	E/C	-----	-----	-----	-----
BF Velocity (fps)	-----	5.5	-----	-----	-----	-----	-----	5.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Discharge (cfs)	-----	95.0	-----	-----	-----	-----	-----	95.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valley Length	-----	-----	-----	-----	-----	-----	-----	1571.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel length (ft)	-----	1954.0	-----	-----	-----	-----	-----	1885.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sinuosity	-----	1.20	-----	-----	-----	-----	-----	1.20	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	0.0118	-----	-----	-----	-----	-----	0.0120	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Bankfull Floodplain Area (acres	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Table 7. Baseline Stream Summary
Big Cedar Creek Restoration Site Contract No. D06054-D
UT1 Reach 4 (996 LF)

Parameter	USGS Gauge	Regional Curve Interval			Pre-Existing Condition						Reference Reach(es) Data Spencer Creek					
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																
BF Width (ft)	-----	7.5	27.0	12.9	-----	23.1	-----	-----	-----	1	-----	8.7	-----	-----	-----	1
Floodprone Width (ft)	-----	-----	-----	-----	-----	69.2	-----	-----	-----	1	-----	228.5	-----	-----	-----	1
BF Mean Depth (ft)	-----	1.0	2.5	1.6	-----	1.0	-----	-----	-----	1	-----	1.2	-----	-----	-----	1
BF Max Depth (ft)	-----	-----	-----	-----	-----	1.8	-----	-----	-----	1	-----	1.9	-----	-----	-----	1
BF Cross-sectional Area (ft^2)	-----	12.0	43.0	24.4	-----	22.6	-----	-----	-----	1	-----	10.6	-----	-----	-----	1
Width/Depth Ratio	-----	-----	-----	-----	-----	23.1	-----	-----	-----	1	-----	7.3	-----	-----	-----	1
Entrenchment Ratio	-----	-----	-----	-----	-----	3.0	-----	-----	-----	1	-----	26.3	-----	-----	-----	1
Bank Height Ratio	-----	-----	-----	-----	-----	1.8	-----	-----	-----	1	-----	1.0	-----	-----	-----	1
d50 (mm)	-----	-----	-----	-----	-----	32.0	-----	-----	-----	1	-----	8.6	-----	-----	-----	1
Pattern																
Channel Beltwidth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	24.0	-----	-----	52.0	-----	2
Radius of Curvature (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	5.4	-----	-----	22.1	-----	5
Rc:Bankfull Width (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.6	-----	-----	2.5	-----	5
Meander Wavelength (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	54.0	-----	-----	196.0	-----	2
Meander Width Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.8	-----	-----	6.0	-----	2
Profile																
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	-----	-----	-----	-----	0.0264	-----	-----	0.2521	-----	-----	0.0100	-----	-----	0.0670	-----	2
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Pool Spacing (ft)	-----	-----	-----	-----	34.4	-----	-----	156.4	-----	-----	13.0	-----	-----	46.5	-----	5
Pool Max Depth (ft)	-----	-----	-----	-----	-----	3.0	-----	-----	-----	-----	-----	2.5	-----	-----	-----	1
Pool Volume (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----			<0.063 / 11 / 32 / 100 / 180						0.06 / 3 / 8.6 / 77 / 180			
Reach Shear Stress (competency) lb/f	-----	-----	-----	-----	-----	0.8	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Max part size (mm) mobilized at bankfull (Rosgen Curve	-----	-----	-----	-----	-----	200.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters																
Drainage Area (SM)	-----	-----	-----	-----	1.2	-----	-----	1.2	-----	-----	-----	-----	-----	0.5	-----	-----
Impervious cover estimate (%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	-----	-----	-----	-----	C4/1	-----	-----	-----	-----	-----	E4/C4	-----	-----	-----	-----
BF Velocity (fps)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Discharge (cfs)	-----	35.0	290.0	102.2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valley Length (ft)	-----	-----	-----	-----	-----	850.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel length (ft)	-----	-----	-----	-----	-----	935.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sinuosity	-----	-----	-----	-----	-----	1.10	-----	-----	-----	-----	-----	1.10	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	-----	-----	-----	-----	0.0145	-----	-----	-----	-----	-----	0.0132	-----	-----	-----	-----
BF Slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Banfull Floodplain Area (Acres	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Table 7. Baseline Stream Summary
Big Cedar Creek Restoration Site Contract No. D06054-D
UT1 Reach 4 (996 LF)

Parameter	Design						As-built						Year 1					
Dimension and Substrate - Riffle	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
BF Width (ft)	-----	16.0	-----	-----	-----	1	16.7	18.7	16.8	22.6	2.8	3	16.3	18.4	16.5	22.5	3.5	3
Floodprone Width (ft)	-----	87.0	-----	-----	-----	1	51.3	57.8	58.6	63.5	5.0	3	56.4	59.5	58.4	63.7	3.8	3
BF Mean Depth (ft)	-----	1.3	-----	-----	-----	1	1.2	1.3	1.3	1.5	0.1	3	1.2	1.5	1.3	2.0	0.4	3
BF Max Depth (ft)	-----	1.7	-----	-----	-----	1	1.8	2.0	2.0	2.3	0.2	3	1.9	2.3	2.0	3.0	0.6	3
BF Cross-sectional Area (ft^2)	-----	20.0	-----	-----	-----	1	21.3	24.8	25.3	27.8	2.7	3	20.6	27.2	27.7	33.2	6.3	3
Width/Depth Ratio	-----	12.3	-----	-----	-----	1	11.2	14.2	13.1	18.4	3.1	3	8.2	13.1	12.9	18.3	5.1	3
Entrenchment Ratio	-----	5.4	-----	-----	-----	1	2.3	3.2	3.5	3.8	0.7	3	2.5	3.3	3.6	3.9	0.7	3
Bank Height Ratio	-----	1.0	-----	-----	-----	1	1.0	1.0	1.0	1.0	1.0	3	1.0	1.0	1.0	1.0	1.0	3
d50 (mm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	40.0	-----	-----	-----	1
Pattern																		
Channel Beltwidth (ft)	31.0	-----	-----	47.0	-----	7	38.0	55.3	41.0	112.0	26.4	7	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	32.0	-----	-----	50.0	-----	9	14.0	36.3	36.0	55.0	1.1	9	-----	-----	-----	-----	-----	-----
Rc:Bankfull width (ft/ft)	2.0	-----	-----	3.1	-----	9	0.9	-----	-----	3.6	-----	9	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	133.0	-----	-----	168.0	-----	5	136.3	156.1	159.8	181.0	62.9	6	-----	-----	-----	-----	-----	-----
Meander Width Ratio	1.9	-----	-----	2.9	-----	7	2.0	-----	-----	3.6	-----	7	-----	-----	-----	-----	-----	-----
Profile																		
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	37.0	55.0	54.0	79.0	13.0	10	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	0.0222	-----	-----	0.0301	-----	12	0.0050	0.0220	0.0230	0.0310	0.0070	10	-----	-----	-----	-----	-----	-----
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	64.0	-----	-----	105.0	-----	9	66.0	81.0	75.0	106.0	13.0	9	-----	-----	-----	-----	-----	-----
Pool Max Depth (ft)	-----	4.0	-----	-----	-----	1	-----	4.6	-----	-----	-----	1	-----	4.3	-----	-----	-----	1
Pool Volume (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																		
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----			11.3 / 26 / 40 / 83 / 180			
Reach Shear Stress (competency) lb/ft	-----	1.1	-----	-----	-----	-----	-----	1.2	-----	-----	-----	1	-----	-----	-----	-----	-----	1
Max part size (mm) mobilized at bankfull (Rosgen Curve)	-----	250.0	-----	-----	-----	-----	-----	290.0	-----	-----	-----	1	-----	-----	-----	-----	-----	1
Stream Power (transport capacity) W/m	-----	-----	-----	-----	-----	-----	-----	68.2	-----	-----	-----	1	-----	-----	-----	-----	-----	1
Additional Reach Parameters																		
Drainage Area (SM)	1.1	-----	-----	1.2	-----	-----	1.1	-----	-----	1.2	-----	-----	1.1	-----	-----	1.2	-----	-----
Impervious cover estimate (%)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	B4c	-----	-----	-----	-----	-----	C	-----	-----	-----	-----	-----	C	-----	-----	-----	-----
BF Velocity (fps)	-----	5.0	-----	-----	-----	-----	-----	4.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Discharge (cfs)	-----	100.0	-----	-----	-----	-----	-----	100.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valley Length	-----	-----	-----	-----	-----	-----	-----	915.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel length (ft)	-----	1501.0	-----	-----	-----	-----	-----	997.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sinuosity	-----	1.00	-----	-----	-----	-----	-----	1.09	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	0.0161	-----	-----	-----	-----	-----	0.0160	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Bankfull Floodplain Area (acres)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Table 7. Baseline Stream Summary
Big Cedar Creek Restoration Site Contract No. D06054-D
UT2 (609 LF)

Parameter	USGS Gauge	Regional Curve Interval			Pre-Existing Condition						Reference Reach(es) Data Spencer Creek					
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle																
BF Width (ft)	-----	5.5	21.0	9.2	-----	9.2	-----	-----	-----	1	-----	8.7	-----	-----	-----	1
Floodprone Width (ft)	-----	-----	-----	-----	-----	>142.2	-----	-----	-----	1	-----	228.5	-----	-----	-----	1
BF Mean Depth (ft)	-----	0.8	2.1	1.2	-----	1.2	-----	-----	-----	1	-----	1.2	-----	-----	-----	1
BF Max Depth (ft)	-----	-----	-----	-----	-----	1.6	-----	-----	-----	1	-----	1.9	-----	-----	-----	1
BF Cross-sectional Area (ft^2)	-----	7.0	27.0	14.3	-----	10.8	-----	-----	-----	1	-----	10.6	-----	-----	-----	1
Width/Depth Ratio	-----	-----	-----	-----	-----	7.7	-----	-----	-----	1	-----	7.3	-----	-----	-----	1
Entrenchment Ratio	-----	-----	-----	-----	-----	>15.5	-----	-----	-----	1	-----	26.3	-----	-----	-----	1
Bank Height Ratio	-----	-----	-----	-----	-----	1.3	-----	-----	-----	1	-----	1.0	-----	-----	-----	1
d50 (mm)	-----	-----	-----	-----	-----	15.0	-----	-----	-----	1	-----	8.6	-----	-----	-----	-----
Pattern		-----	-----													
Channel Beltwidth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	24.0	-----	-----	52.0	-----	2
Radius of Curvature (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	5.4	-----	-----	22.1	-----	5
Rc:Bankfull Width (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.6	-----	-----	2.5	-----	5
Meander Wavelength (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	54.0	-----	-----	196.0	-----	2
Meander Width Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.8	-----	-----	6.0	-----	2
Profile																
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.0100	-----	-----	0.0670	-----	2
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Pool Spacing (ft)	-----	-----	-----	-----	61.0	-----	-----	114.0	-----	-----	13.0	-----	-----	46.5	-----	5
Pool Max Depth (ft)	-----	-----	-----	-----	-----	2.2	-----	-----	-----	-----	-----	2.5	-----	-----	-----	1
Pool Volume (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----			<0.063 / 8 / 15 / 64 / 90						0.06 / 3 / 8.6 / 77 / 180			
Reach Shear Stress (competency) lb/f	-----	-----	-----	-----	-----	1.3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Max part size (mm) mobilized at bankfull (Rosgen Curve	-----	-----	-----	-----	-----	300.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters																
Drainage Area (SM)	-----	-----	-----	-----	0.5	-----	-----	0.6	-----	-----	-----	-----	-----	0.5	-----	-----
Impervious cover estimate (%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	-----	-----	-----	-----	G4	-----	-----	-----	-----	-----	E4/C4	-----	-----	-----	-----
BF Velocity (fps)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Discharge (cfs)	-----	20.0	175.0	57.8	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valley Length (ft)	-----	-----	-----	-----	-----	568.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel length (ft)	-----	-----	-----	-----	-----	625.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sinuosity	-----	-----	-----	-----	-----	1.10	-----	-----	-----	-----	-----	1.10	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	-----	-----	-----	-----	0.0215	-----	-----	-----	-----	-----	0.0130	-----	-----	-----	-----
BF Slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Banfull Floodplain Area (Acres	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Table 7. Baseline Stream Summary
Big Cedar Creek Restoration Site Contract No. D06054-D
UT2 (609 LF)

Parameter	Design						As-built						Year 1					
Dimension and Substrate - Riffle	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
BF Width (ft)	-----	13	-----	-----	-----	1	-----	13.4	-----	-----	-----	1	-----	13.2	-----	-----	-----	1
Floodprone Width (ft)	-----	74.0+	-----	-----	-----	1	-----	63.1	-----	-----	-----	1	-----	63.1	-----	-----	-----	1
BF Mean Depth (ft)	-----	1.1	-----	-----	-----	1	-----	1.4	-----	-----	-----	1	-----	1.5	-----	-----	-----	1
BF Max Depth (ft)	-----	1.4	-----	-----	-----	1	-----	1.9	-----	-----	-----	1	-----	2.1	-----	-----	-----	1
BF Cross-sectional Area (ft^2)	-----	14.3	-----	-----	-----	1	-----	18.1	-----	-----	-----	1	-----	20.1	-----	-----	-----	1
Width/Depth Ratio	-----	11.8	-----	-----	-----	1	-----	9.9	-----	-----	-----	1	-----	8.7	-----	-----	-----	1
Entrenchment Ratio	-----	5.7+	-----	-----	-----	1	-----	4.7	-----	-----	-----	1	-----	4.8	-----	-----	-----	1
Bank Height Ratio	-----	1.0	-----	-----	-----	1	-----	1.0	-----	-----	-----	1	-----	1.0	-----	-----	-----	1
d50 (mm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	22.6	-----	-----	-----	1
Pattern																		
Channel Beltwidth (ft)	46.0	-----	-----	55.0	-----	7	44.0	52.6	53.0	61.0	5.6	7	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	23.0	-----	-----	37.0	-----	7	25.0	31.6	30.0	43.0	6.4	7	-----	-----	-----	-----	-----	-----
Rc:Bankfull width (ft/ft)	1.8	-----	-----	2.8	-----	7	2.5	-----	-----	3.6	-----	7	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	98.0	-----	-----	142.0	-----	6	99.0	122.4	120.5	147.8	17.0	6	-----	-----	-----	-----	-----	-----
Meander Width Ratio	3.5	-----	-----	4.2	-----	7	5.4	-----	-----	6.7	-----	1	-----	-----	-----	-----	-----	-----
Profile																		
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	20.0	40.8	43.0	56.0	12.5	8	20.0	26.0	28.0	30.0	5.3	3
Riffle Slope (ft/ft)	0.0230	-----	-----	0.0504	-----	8	0.0090	0.0280	0.0280	0.0490	0.0120	8	0.02	0.02	0.02	0.03	0.00	3
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	62.0	-----	-----	99.0	-----	7	55.0	76.0	73.0	103.0	15.7	7	-----	93.0	-----	93.0	-----	1
Pool Max Depth (ft)	-----	3.6	-----	-----	-----	1	-----	2.5	-----	-----	-----	1	-----	2.6	-----	-----	-----	1
Pool Volume (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																		
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----			6.5 / 16 / 22.6 / 60 / 100			
Reach Shear Stress (competency) lb/f	-----	0.9	-----	-----	-----	-----	-----	1.0	-----	-----	-----	1	-----	0.9	-----	-----	-----	1
Max part size (mm) mobilized at bankfull (Rosgen Curve	-----	220.0	-----	-----	-----	-----	-----	250.0	-----	-----	-----	1	-----	205.0	-----	-----	-----	1
Stream Power (transport capacity) W/m	-----	-----	-----	-----	-----	-----	-----	44.0	-----	-----	-----	1	-----	34.5	-----	-----	-----	1
Additional Reach Parameters																		
Drainage Area (SM)	0.5	-----	-----	0.6	-----	-----	0.5	-----	-----	0.6	-----	-----	0.5	-----	-----	0.6	-----	-----
Impervious cover estimate (%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	E/C4	-----	-----	-----	-----	-----	E	-----	-----	-----	-----	-----	E	-----	-----	-----	-----
BF Velocity (fps)	-----	3.9	-----	-----	-----	-----	-----	3.1	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Discharge (cfs)	-----	56.0	-----	-----	-----	-----	-----	56.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valley Length	-----	-----	-----	-----	-----	-----	-----	476.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel length (ft)	-----	605.0	-----	-----	-----	-----	-----	609.0	-----	-----	-----	-----	-----	191.0	-----	-----	-----	-----
Sinuosity	-----	1.20	-----	-----	-----	-----	-----	1.28	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)	-----	0.0150	-----	-----	-----	-----	-----	0.0140	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.011	-----	-----	-----	-----
Bankfull Floodplain Area (acres	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Table 8. Morphology and Hydraulic Monitoring Summary

Big Cedar Creek Restoration Site: Project No. D06054-D

Big Cedar Creek Reach 1 (603 LF)

	Cross-section 1 (Riffle)						Cross-section 2 (Pool)																	
Dimension and substrate	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Based on fixed baseline bankfull elevation																								
BF Width (ft)	19.6	19.5					28.0	27.3																
BF Mean Depth (ft)	1.9	1.8					1.8	1.7																
Width/Depth Ratio	10.4	10.7					15.7	15.7																
BF Cross-sectional Area (ft²)	37.1	35.6					50.1	47.5																
BF Max Depth (ft)	2.7	2.6					3.9	3.75																
Width of Floodprone Area (ft)	>64.7	>65.2					>78.0	>78.0																
Entrenchment Ratio	>3.3	3.3					N/A	N/A																
Bank Height Ratio	1.0	1.0					1.0	1																
Wetted Perimeter (ft)	23.4	23.1					31.6	30.7																
Hydraulic Radius (ft)	1.6	1.5					1.6	1.5																
Based on current/developing bankfull feature																								
BF Width (ft)																								
BF Mean Depth (ft)																								
Width/Depth Ratio																								
BF Cross-sectional Area (ft²)																								
BF Max Depth (ft)																								
Width of Floodprone Area (ft)																								
Entrenchment Ratio																								
Bank Height Ratio																								
Wetted Perimeter (ft)																								
Hydraulic Radius (ft)																								
Cross Sectional Area between end pins (ft^2)	-						-																	
d50 (mm)	-						-																	

Dimension and substrate	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Based on fixed baseline bankfull elevation																								
BF Width (ft)																								
BF Mean Depth (ft)																								
Width/Depth Ratio																								
BF Cross-sectional Area (ft²)																								
BF Max Depth (ft)																								
Width of Floodprone Area (ft)																								
Entrenchment Ratio																								
Bank Height Ratio																								
Wetted Perimeter (ft)																								
Hydraulic Radius (ft)																								
Based on current/developing bankfull feature																								
BF Width (ft)																								
BF Mean Depth (ft)																								
Width/Depth Ratio																								
BF Cross-sectional Area (ft²)																								
BF Max Depth (ft)																								
Width of Floodprone Area (ft)																								
Entrenchment Ratio																								
Bank Height Ratio																								
Wetted Perimeter (ft)																								
Hydraulic Radius (ft)																								
Cross Sectional Area between end pins (ft^2)																								
d50 (mm)																								

Table 8. Morphology and Hydraulic Monitoring Summary

Big Cedar Creek Restoration Site: Project No. D06054-D

Big Cedar Creek Reach 2 (2239 LF)

	Cross-section 3 (Riffle)						Cross-section 4 (Pool)						Cross-section 5 (Riffle)						Cross-section 6 (Pool)					
Dimension and substrate	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Based on fixed baseline bankfull elevation																								
BF Width (ft)	25.7	25.2					33.0	33.1					22.5	22.5					34.8	35.7				
BF Mean Depth (ft)	2.5	2.3					2.3	2.0					2.2	2.5					2.5	2.34				
Width/Depth Ratio	10.4	10.8					14.6	16.3					10.2	9.0					13.7	15.25				
BF Cross-sectional Area (ft²)	63.1	59.0					74.3	67.2					49.7	56.2					88.2	83.4				
BF Max Depth (ft)	3.9	3.8					5.5	5.7					3.3	4.2					5.5	5.21				
Width of Floodprone Area (ft)	>75.8	>75.7					>83.5	>83.5					>74.4	>74.3					>86.2	>86.2				
Entrenchment Ratio	>3.0	3.0					N/A	N/A					>3.3	3.3					N/A	N/A				
Bank Height Ratio	1.0	1.0					1.0	1.0					1.0	1.0					1.0	1				
Wetted Perimeter (ft)	30.6	29.9					37.5	37.1					26.9	27.5					39.9	40.4				
Hydraulic Radius (ft)	2.1	2.0					2.0	1.8					1.8	2.0					2.2	2.1				
Based on current/developing bankfull feature																								
BF Width (ft)																								
BF Mean Depth (ft)																								
Width/Depth Ratio																								
BF Cross-sectional Area (ft²)																								
BF Max Depth (ft)																								
Width of Floodprone Area (ft)																								
Entrenchment Ratio																								
Bank Height Ratio																								
Wetted Perimeter (ft)																								
Hydraulic Radius (ft)																								
Cross Sectional Area between end pins (ft²)	-						-						-						-					
d50 (mm)	-						-						-						-					

	Cross-section 7 (Riffle)																							
Dimension and substrate	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Based on fixed baseline bankfull elevation																								
BF Width (ft)	22.3	22.3																						
BF Mean Depth (ft)	2.5	2.58																						
Width/Depth Ratio	8.9	8.65																						
BF Cross-sectional Area (ft²)	55.6	57.6																						
BF Max Depth (ft)	3.9	4.1																						
Width of Floodprone Area (ft)	>75.8	>74.5																						
Entrenchment Ratio	>3.4	3.3																						
Bank Height Ratio	1.0	1																						
Wetted Perimeter (ft)	27.3	27.5																						
Hydraulic Radius (ft)	2.0	2.1																						
Based on current/developing bankfull feature																								
BF Width (ft)																								
BF Mean Depth (ft)																								
Width/Depth Ratio																								
BF Cross-sectional Area (ft²)																								
BF Max Depth (ft)																								
Width of Floodprone Area (ft)																								
Entrenchment Ratio																								
Bank Height Ratio																								
Wetted Perimeter (ft)																								
Hydraulic Radius (ft)																								
Cross Sectional Area between end pins (ft²)	-																							
d50 (mm)	-																							

Table 8. Morphology and Hydraulic Monitoring Summary

Big Cedar Creek Restoration Site: Project No. D06054-D

Big Cedar Creek Reach 3 (1827 LF)

	Cross-section 8 (Pool)						Cross-section 9 (Riffle)						Cross-section 10 (Riffle)						Cross-section 11 (Riffle)					
Dimension and substrate	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Based on fixed baseline bankfull elevation																								
BF Width (ft)	38.8	37.0					23.1	22.3					24.6	23.1					25.0	24.9				
BF Mean Depth (ft)	2.5	2.3					2.2	2.3					2.1	2.2					2.5	2.4				
Width/Depth Ratio	15.6	15.8					10.7	9.8					11.7	10.5					9.9	10.3				
BF Cross-sectional Area (ft²)	96.4	86.6					50.1	50.5					51.8	50.8					63.2	60.4				
BF Max Depth (ft)	5.4	5.2					3.1	3.1					3.1	3.1					3.8	3.7				
Width of Floodprone Area (ft)	>89.5	>89.5					>77.8	>77.8					>77.9	>78					>82.5	>82.9				
Entrenchment Ratio	N/A	N/A					>3.4	3.5					>3.2	3.4					>3.3	3.3				
Bank Height Ratio	1.0	1.0					1.0	1.0					1.0	1.0					1.0	1				
Wetted Perimeter (ft)	43.8	41.6					27.5	26.9					28.8	27.5					30.0	29.7				
Hydraulic Radius (ft)	2.2	2.1					1.8	1.9					1.8	1.8					2.1	2.0				
Based on current/developing bankfull feature																								
BF Width (ft)																								
BF Mean Depth (ft)																								
Width/Depth Ratio																								
BF Cross-sectional Area (ft²)																								
BF Max Depth (ft)																								
Width of Floodprone Area (ft)																								
Entrenchment Ratio																								
Bank Height Ratio																								
Wetted Perimeter (ft)																								
Hydraulic Radius (ft)																								
Cross Sectional Area between end pins (ft²)	-						-						-						-					
d50 (mm)	-						-						-						-					

	Cross-section 8 (Pool)						Cross-section 9 (Riffle)						Cross-section 10 (Riffle)						Cross-section 11 (Riffle)					
Dimension and substrate	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Based on fixed baseline bankfull elevation																								
BF Width (ft)																								
BF Mean Depth (ft)																								
Width/Depth Ratio																								
BF Cross-sectional Area (ft²)																								
BF Max Depth (ft)																								
Width of Floodprone Area (ft)																								
Entrenchment Ratio																								
Bank Height Ratio																								
Wetted Perimeter (ft)																								
Hydraulic Radius (ft)																								
Based on current/developing bankfull feature																								
BF Width (ft)																								
BF Mean Depth (ft)																								
Width/Depth Ratio																								
BF Cross-sectional Area (ft²)																								
BF Max Depth (ft)																								
Width of Floodprone Area (ft)																								
Entrenchment Ratio																								
Bank Height Ratio																								
Wetted Perimeter (ft)																								
Hydraulic Radius (ft)																								
Cross Sectional Area between end pins (ft²)																								
d50 (mm)																								

Table 8. Morphology and Hydraulic Monitoring Summary

Big Cedar Creek Restoration Site: Project No. D06054-D

Big Cedar Creek Reach 4 (410 LF)

	Cross-section 12 (Pool)						Cross-section 13 (Riffle)																	
Dimension and substrate	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Based on fixed baseline bankfull elevation																								
BF Width (ft)	38.0	37.2					27.5	27.8																
BF Mean Depth (ft)	2.3	2.2					2.1	2.3																
Width/Depth Ratio	16.3	17.1					13.0	12.4																
BF Cross-sectional Area (ft²)	88.5	80.7					58.3	62.6																
BF Max Depth (ft)	4.7	4.3					3.2	3.7																
Width of Floodprone Area (ft)	>89.2	>89.1					>81.0	>81.1																
Entrenchment Ratio	N/A	N/A					>2.9	2.9																
Bank Height Ratio	1.0	1.0					1.0	1																
Wetted Perimeter (ft)	42.6	41.6					31.7	32.4																
Hydraulic Radius (ft)	2.1	1.9					1.8	1.9																
Based on current/developing bankfull feature																								
BF Width (ft)																								
BF Mean Depth (ft)																								
Width/Depth Ratio																								
BF Cross-sectional Area (ft²)																								
BF Max Depth (ft)																								
Width of Floodprone Area (ft)																								
Entrenchment Ratio																								
Bank Height Ratio																								
Wetted Perimeter (ft)																								
Hydraulic Radius (ft)																								
Cross Sectional Area between end pins (ft^2)	-						-																	
d50 (mm)	-						-																	

Dimension and substrate	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Based on fixed baseline bankfull elevation																								
BF Width (ft)																								
BF Mean Depth (ft)																								
Width/Depth Ratio																								
BF Cross-sectional Area (ft²)																								
BF Max Depth (ft)																								
Width of Floodprone Area (ft)																								
Entrenchment Ratio																								
Bank Height Ratio																								
Wetted Perimeter (ft)																								
Hydraulic Radius (ft)																								
Based on current/developing bankfull feature																								
BF Width (ft)																								
BF Mean Depth (ft)																								
Width/Depth Ratio																								
BF Cross-sectional Area (ft²)																								
BF Max Depth (ft)																								
Width of Floodprone Area (ft)																								
Entrenchment Ratio																								
Bank Height Ratio																								
Wetted Perimeter (ft)																								
Hydraulic Radius (ft)																								
Cross Sectional Area between end pins (ft^2)																								
d50 (mm)																								

Table 8. Morphology and Hydraulic Monitoring Summary

Big Cedar Creek Restoration Site: Project No. D06054-D

UT1 Reach 1 (1248 LF)

	Cross-section 14 (Riffle)						Cross-section 15 (Pool)						Cross-section 16 (Riffle)						Cross-section 17 (Pool)					
Dimension and substrate	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Based on fixed baseline bankfull elevation																								
BF Width (ft)	14.7	13.7					33.3	34.8					11.6	12.0					24.3	22				
BF Mean Depth (ft)	1.0	1.0					1.3	1.1					1.3	1.3					1.3	1.3				
Width/Depth Ratio	14.2	14.2					26.8	30.5					8.8	9.0					18.7	16.4				
BF Cross-sectional Area (ft²)	15.2	13.7					41.6	39.8					15.2	16.1					31.6	29.5				
BF Max Depth (ft)	1.7	1.6					3.3	3.1					2.1	2.2					2.9	2.7				
Width of Floodprone Area (ft)	>56.5	>56.4					>57.2	>57.2					>48.4	>48.5					>55.8	>55.5				
Entrenchment Ratio	>3.8	4.0					N/A	N/A					>4.2	4.0					N/A	N/A				
Bank Height Ratio	1.0	1.0					1.0	1.0					1.0	1.0					1.0	1				
Wetted Perimeter (ft)	16.7	15.7					35.9	37.0					14.2	14.6					26.9	24.6				
Hydraulic Radius (ft)	0.9	0.9					1.2	1.1					1.1	1.1					1.2	1.2				
Based on current/developing bankfull feature																								
BF Width (ft)																								
BF Mean Depth (ft)																								
Width/Depth Ratio																								
BF Cross-sectional Area (ft²)																								
BF Max Depth (ft)																								
Width of Floodprone Area (ft)																								
Entrenchment Ratio																								
Bank Height Ratio																								
Wetted Perimeter (ft)																								
Hydraulic Radius (ft)																								
Cross Sectional Area between end pins (ft²)	-						-						-						-					
d50 (mm)	-						-						-						-					

	Cross-section 18 (Riffle)																							
Dimension and substrate	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Based on fixed baseline bankfull elevation																								
BF Width (ft)	13.2	12.8																						
BF Mean Depth (ft)	1.1	1.1																						
Width/Depth Ratio	12.3	12.1																						
BF Cross-sectional Area (ft²)	14.2	13.6																						
BF Max Depth (ft)	1.8	1.7																						
Width of Floodprone Area (ft)	>56.6	>53.5																						
Entrenchment Ratio	>4.0	4.2																						
Bank Height Ratio	1.0	1																						
Wetted Perimeter (ft)	15.4	15.0																						
Hydraulic Radius (ft)	0.9	0.9																						
Based on current/developing bankfull feature																								
BF Width (ft)																								
BF Mean Depth (ft)																								
Width/Depth Ratio																								
BF Cross-sectional Area (ft²)																								
BF Max Depth (ft)																								
Width of Floodprone Area (ft)																								
Entrenchment Ratio																								
Bank Height Ratio																								
Wetted Perimeter (ft)																								
Hydraulic Radius (ft)																								
Cross Sectional Area between end pins (ft²)	-																							
d50 (mm)	39																							

Table 8. Morphology and Hydraulic Monitoring Summary

Big Cedar Creek Restoration Site: Project No. D06054-D

UT1 Reach 2 (1016 LF)

	Cross-section 19 (Riffle)						Cross-section 20 (Pool)						Cross-section 21 (Riffle)						Cross-section 22 (Riffle)					
Dimension and substrate	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Based on fixed baseline bankfull elevation																								
BF Width (ft)	13.4	12.5					21.2	22.0					15.9	15.1					14.1	14.3				
BF Mean Depth (ft)	1.1	1.0					1.3	1.4					1.1	1.1					1.2	1.2				
Width/Depth Ratio	12.4	12.0					16.8	15.6					14.0	14.2					12.1	11.8				
BF Cross-sectional Area (ft²)	14.5	13.0					26.7	31.1					17.9	16.0					16.3	17.4				
BF Max Depth (ft)	1.8	1.7					2.8	2.9					1.9	1.7					1.8	2.1				
Width of Floodprone Area (ft)	>56.4	>56.3					>62.4	>62.5					>58.8	>58.9					>60.1	>60.1				
Entrenchment Ratio	>4.2	4.5					N/A	N/A					>3.7	3.9					>4.3	4.2				
Bank Height Ratio	1.0	1.0					1.0	1.0					1.0	1.0					1.0	1				
Wetted Perimeter (ft)	15.6	14.5					23.8	24.8					18.1	17.3					16.4	16.7				
Hydraulic Radius (ft)	0.9	0.9					1.1	1.3					1.0	0.9					1.0	1.0				
Based on current/developing bankfull feature																								
BF Width (ft)																								
BF Mean Depth (ft)																								
Width/Depth Ratio																								
BF Cross-sectional Area (ft²)																								
BF Max Depth (ft)																								
Width of Floodprone Area (ft)																								
Entrenchment Ratio																								
Bank Height Ratio																								
Wetted Perimeter (ft)																								
Hydraulic Radius (ft)																								
Cross Sectional Area between end pins (ft²)	-						-						-						-					
d50 (mm)	-						-						-						-					

	Cross-section 19 (Riffle)						Cross-section 20 (Pool)						Cross-section 21 (Riffle)						Cross-section 22 (Riffle)					
Dimension and substrate	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Based on fixed baseline bankfull elevation																								
BF Width (ft)																								
BF Mean Depth (ft)																								
Width/Depth Ratio																								
BF Cross-sectional Area (ft²)																								
BF Max Depth (ft)																								
Width of Floodprone Area (ft)																								
Entrenchment Ratio																								
Bank Height Ratio																								
Wetted Perimeter (ft)																								
Hydraulic Radius (ft)																								
Based on current/developing bankfull feature																								
BF Width (ft)																								
BF Mean Depth (ft)																								
Width/Depth Ratio																								
BF Cross-sectional Area (ft²)																								
BF Max Depth (ft)																								
Width of Floodprone Area (ft)																								
Entrenchment Ratio																								
Bank Height Ratio																								
Wetted Perimeter (ft)																								
Hydraulic Radius (ft)																								
Cross Sectional Area between end pins (ft²)																								
d50 (mm)																								

Table 8. Morphology and Hydraulic Monitoring Summary

Big Cedar Creek Restoration Site: Project No. D06054-D

UT1 Reach 3 (1885 LF)

	Cross-section 23 (Pool)						Cross-section 24 (Riffle)						Cross-section 25 (Riffle)						Cross-section 26 (Riffle)					
Dimension and substrate	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Based on fixed baseline bankfull elevation																								
BF Width (ft)	21.8	20.8					15.1	16.9					15.3	14.0					16.2	15.8				
BF Mean Depth (ft)	1.5	1.4					1.2	1.3					1.2	1.1					1.3	1.1				
Width/Depth Ratio	14.3	15.3					12.7	12.9					13.1	13.1					12.6	14				
BF Cross-sectional Area (ft²)	33.3	28.2					17.9	22.0					17.8	15.0					20.9	17.8				
BF Max Depth (ft)	3.0	2.7					1.7	2.3					1.8	1.6					2.2	1.7				
Width of Floodprone Area (ft)	>64.2	>64.3					>57.1	>57.1					>56.9	>56.9					>58.6	>58.8				
Entrenchment Ratio	N/A	N/A					>3.8	3.4					>3.7	3.6					>3.6	3.7				
Bank Height Ratio	1.0	1.0					1.0	1.0					1.0	1.0					1.0	1				
Wetted Perimeter (ft)	24.9	23.6					17.5	19.5					17.6	16.2					18.8	18.0				
Hydraulic Radius (ft)	1.3	1.2					1.0	1.1					1.0	0.9					1.1	1.0				
Based on current/developing bankfull feature																								
BF Width (ft)																								
BF Mean Depth (ft)																								
Width/Depth Ratio																								
BF Cross-sectional Area (ft²)																								
BF Max Depth (ft)																								
Width of Floodprone Area (ft)																								
Entrenchment Ratio																								
Bank Height Ratio																								
Wetted Perimeter (ft)																								
Hydraulic Radius (ft)																								
Cross Sectional Area between end pins (ft^2)	-						-						-						-					
d50 (mm)	-						-						-						-					

	Cross-section 27 (Pool)																							
Dimension and substrate	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Based on fixed baseline bankfull elevation																								
BF Width (ft)	24.3	25.9																						
BF Mean Depth (ft)	1.3	1.2																						
Width/Depth Ratio	18.1	19.2																						
BF Cross-sectional Area (ft²)	32.5	25.9																						
BF Max Depth (ft)	3.0	2.7																						
Width of Floodprone Area (ft)	>64.4	>64.5																						
Entrenchment Ratio	N/A	N/A																						
Bank Height Ratio	1.0	1																						
Wetted Perimeter (ft)	27.0	28.3																						
Hydraulic Radius (ft)	1.2	0.9																						
Based on current/developing bankfull feature																								
BF Width (ft)																								
BF Mean Depth (ft)																								
Width/Depth Ratio																								
BF Cross-sectional Area (ft²)																								
BF Max Depth (ft)																								
Width of Floodprone Area (ft)																								
Entrenchment Ratio																								
Bank Height Ratio																								
Wetted Perimeter (ft)																								
Hydraulic Radius (ft)																								
Cross Sectional Area between end pins (ft^2)	-																							
d50 (mm)	-																							

Table 8. Morphology and Hydraulic Monitoring Summary

Big Cedar Creek Restoration Site: Project No. D06054-D

UT1 Reach 4 (996 LF)

	Cross-section 28 (Riffle)						Cross-section 29 (Pool)						Cross-section 30 (Riffle)						Cross-section 31 (Riffle)					
Dimension and substrate	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Based on fixed baseline bankfull elevation																								
BF Width (ft)	16.7	16.3					19.2	20.6					16.8	16.5					22.6	22.5				
BF Mean Depth (ft)	1.3	1.3					2.2	2.3					1.5	2.0					1.2	1.2				
Width/Depth Ratio	13.1	12.9					8.7	9.0					11.2	8.2					18.4	18.3				
BF Cross-sectional Area (ft²)	21.3	20.6					42.0	47.1					25.3	33.2					27.8	27.7				
BF Max Depth (ft)	2.0	2					4.6	4.3					2.3	3.0					1.8	1.9				
Width of Floodprone Area (ft)	>58.6	>58.4					>61.7	>61.6					>63.5	>63.7					51.3	>56.4				
Entrenchment Ratio	>3.5	3.6					N/A	N/A					>3.8	3.9					2.3	2.5				
Bank Height Ratio	1.0	1					1.0	1.0					1.0	1.0					1.0	1				
Wetted Perimeter (ft)	19.2	18.9					23.5	25.2					19.8	20.5					25.1	24.9				
Hydraulic Radius (ft)	1.1	1.1					1.8	1.9					1.3	1.6					1.1	1.1				
Based on current/developing bankfull feature																								
BF Width (ft)																								
BF Mean Depth (ft)																								
Width/Depth Ratio																								
BF Cross-sectional Area (ft²)																								
BF Max Depth (ft)																								
Width of Floodprone Area (ft)																								
Entrenchment Ratio																								
Bank Height Ratio																								
Wetted Perimeter (ft)																								
Hydraulic Radius (ft)																								
Cross Sectional Area between end pins (ft²)	-						-						-						-					
d50 (mm)	-						-						-						-					

	Cross-section 28 (Riffle)						Cross-section 29 (Pool)						Cross-section 30 (Riffle)						Cross-section 31 (Riffle)					
Dimension and substrate	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Based on fixed baseline bankfull elevation																								
BF Width (ft)																								
BF Mean Depth (ft)																								
Width/Depth Ratio																								
BF Cross-sectional Area (ft²)																								
BF Max Depth (ft)																								
Width of Floodprone Area (ft)																								
Entrenchment Ratio																								
Bank Height Ratio																								
Wetted Perimeter (ft)																								
Hydraulic Radius (ft)																								
Based on current/developing bankfull feature																								
BF Width (ft)																								
BF Mean Depth (ft)																								
Width/Depth Ratio																								
BF Cross-sectional Area (ft²)																								
BF Max Depth (ft)																								
Width of Floodprone Area (ft)																								
Entrenchment Ratio																								
Bank Height Ratio																								
Wetted Perimeter (ft)																								
Hydraulic Radius (ft)																								
Cross Sectional Area between end pins (ft²)																								
d50 (mm)																								

Table 8. Morphology and Hydraulic Monitoring Summary

Big Cedar Creek Restoration Site: Project No. D06054-D

UT2 (609 LF)

	Cross-section 32 (Riffle)						Cross-section 33 (Pool)																	
Dimension and substrate	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Based on fixed baseline bankfull elevation																								
BF Width (ft)	13.4	13.2					26.8	21.8																
BF Mean Depth (ft)	1.4	1.5					1.1	1.1																
Width/Depth Ratio	9.9	8.7					24.4	20																
BF Cross-sectional Area (ft²)	18.1	20.1					29.4	23.7																
BF Max Depth (ft)	1.9	2.1					2.9	2.9																
Width of Floodprone Area (ft)	>63.1	>63.1					>69.8	>69.8																
Entrenchment Ratio	>4.7	4.8					N/A	N/A																
Bank Height Ratio	1.0	1					1.0	1																
Wetted Perimeter (ft)	16.1	16.2					29.0	24.0																
Hydraulic Radius (ft)	1.1	1.2					1.0	1.0																
Based on current/developing bankfull feature																								
BF Width (ft)																								
BF Mean Depth (ft)																								
Width/Depth Ratio																								
BF Cross-sectional Area (ft²)																								
BF Max Depth (ft)																								
Width of Floodprone Area (ft)																								
Entrenchment Ratio																								
Bank Height Ratio																								
Wetted Perimeter (ft)																								
Hydraulic Radius (ft)																								
Cross Sectional Area between end pins (ft^2)	-						-																	
d50 (mm)	-						-																	

Dimension and substrate	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Based on fixed baseline bankfull elevation																								
BF Width (ft)																								
BF Mean Depth (ft)																								
Width/Depth Ratio																								
BF Cross-sectional Area (ft²)																								
BF Max Depth (ft)																								
Width of Floodprone Area (ft)																								
Entrenchment Ratio																								
Bank Height Ratio																								
Wetted Perimeter (ft)																								
Hydraulic Radius (ft)																								
Based on current/developing bankfull feature																								
BF Width (ft)																								
BF Mean Depth (ft)																								
Width/Depth Ratio																								
BF Cross-sectional Area (ft²)																								
BF Max Depth (ft)																								
Width of Floodprone Area (ft)																								
Entrenchment Ratio																								
Bank Height Ratio																								
Wetted Perimeter (ft)																								
Hydraulic Radius (ft)																								
Cross Sectional Area between end pins (ft^2)																								
d50 (mm)																								

Table B.1. Stream Problem Areas Big Cedar Creek Restoration Site: Project No. D06054-D			
BCC Reach 1			
Feature Issue	**Station No.**	**Suspected Cause**	**Photo Number**
Aggradation / Bar Formation	11+60	Offsite sediment	SP1
Bank Scour / Raw Bank			
Bed Scour/Degradation			
Engineered Structures - back or arm scour			
BCC Reach 2			
Feature Issue	**Station No.**	**Suspected Cause**	**Photo Number**
Aggradation / Bar Formation	33+20	Thalweg shifted	SP2
Bank Scour / Raw Bank	32+40	Unknown	SP3
Bed Scour/Degradation	25+00	Upstream pool is small	SP4
	30+00	Upstream pool is small	
	37+25	Upstream pool is small	
Engineered Structures - back or arm scour	31+80	Unknown	SP5
Engineered Structures - improper elevations	30+50	Structure set too high	SP6
	31+80	Structure set too high	
BCC Reach 3			
Feature Issue	**Station No.**	**Suspected Cause**	**Photo Number**
Aggradation / Bar Formation			
Bank Scour / Raw Bank	48+50	Matting pulled up	SP7
	51+50	Thalweg shifted towards bank	
Bed Scour/Degradation			
Engineered Structures - back or arm scour	54+80	Unknown	SP8
Engineered Structures - improper elevations	54+25	Structure set too low (submerged)	SP9
BCC Reach 4			
Feature Issue	**Station No.**	**Suspected Cause**	**Photo Number**
Aggradation / Bar Formation			
Bank Scour / Raw Bank	57+90	Overland flow during storm event	SP10
	59+50	Thalweg shifted towards bank	
Bed Scour/Degradation			
Engineered Structures - back or arm scour			

Table B.1. Stream Problem Areas Big Cedar Creek Restoration Site: Project No. D06054-D			
UT1 Reach 3			
Feature Issue	**Station No.**	**Suspected Cause**	**Photo Number**
Aggradation / Bar Formation			
Bank Scour / Raw Bank	39+50	Thalweg shifted towards bank	SP11
	40+15	Matting pulled up	
Bed Scour/Degradation			
Engineered Structures - back or arm scour			
UT1 Reach 4			
Feature Issue	**Station No.**	**Suspected Cause**	**Photo Number**
Aggradation / Bar Formation			
Bank Scour / Raw Bank	54+80	Thalweg shifted towards bank	SP12
	55+95	Matting pulled up	
	56+25	Matting pulled up	
	56+70	Overland flow during storm event	
	57+80	Rocky soils not allowing veg. to establish	
Bed Scour/Degradation	55+50	Upstream pool is small	SP13
	56+90	No bed armor	
	58+00	Upstream pool is small	
Engineered Structures - back or arm scour			

Table B2. Visual Morphological Stability Assessment
Big Cedar Creek Restoration Site: Project No. D06054-D

BCC Reach 1 (603 LF)

Feature Category	Metric (per As-Built and reference baselines)	(# Stable) Number Performing as Intended	Total number per As-Built	Total Number / feet in unstable state	% Performing in Stable Condition	Feature Perfomance Mean or Total
A. Riffles	1. Present?	3	3	N/A	100	
	2. Armor stable (e.g. no displacement)?	3	3	N/A	100	
	3. Facet grades appears stable?	3	3	N/A	100	
	4. Minimal evidence of embedding/fining?	3	3	N/A	100	
	5. Length appropriate?	3	3	N/A	100	**100%**
B. Pools	1. Present? (e.g. not subject to severe aggradation or migration?)	4	4	N/A	100	
	2. Sufficiently deep (Max Pool D:Mean Bkf >1.6?)	4	4	N/A	100	
	3. Length appropriate?	4	4	N/A	100	**100%**
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	2	3	N/A	67	
	2. Downstream of meander (glide/inflection) centering?	3	3	N/A	100	**84%**
D. Meanders	1. Outer bend in state of limited/controlled erosion?	3	3	N/A	100	
	2. Of those eroding, # w/concomitant point bar formation?	N/A	N/A	N/A	N/A	
	3. Apparent Rc within spec?	3	3	N/A	100	
	4. Sufficient floodplain access and relief?	3	3	N/A	100	**100%**
E. Bed General	1. General channel bed aggradation areas (bar formation)	N/A	N/A	1/20	96	
	2. Channel bed degradation - areas of increasing down-cutting or head cutting?	N/A	N/A	0	100	**98%**
F. Bank	1. Actively eroding, wasting, or slumping bank	N/A	N/A	0	100	**100%**
G. Vanes	1. Free of back or arm scour?	N/A	N/A	N/A	N/A	
	2. Height appropriate?	N/A	N/A	N/A	N/A	
	3. Angle and geometry appear appropriate?	N/A	N/A	N/A	N/A	
	4. Free of piping or other structural failures?	N/A	N/A	N/A	N/A	**N/A**
H. Wads/ Boulders	1. Free of scour?	4	4	N/A	100	
	2. Footing stable?	4	4	N/A	100	**100%**

BCC Reach 2 (2220 LF)

Feature Category	Metric (per As-Built and reference baselines)	(# Stable) Number Performing as Intended	Total number per As-Built	Total Number / feet in unstable state	% Performing in Stable Condition	Feature Perfomance Mean or Total
A. Riffles	1. Present?	10	15	N/A	67	
	2. Armor stable (e.g. no displacement)?	13	15	N/A	87	
	3. Facet grades appears stable?	12	15	N/A	80	
	4. Minimal evidence of embedding/fining?	15	15	N/A	100	
	5. Length appropriate?	13	15	N/A	87	**84%**
B. Pools	1. Present? (e.g. not subject to severe aggradation or migration?)	15	15	N/A	100	
	2. Sufficiently deep (Max Pool D:Mean Bkf >1.6?)	15	15	N/A	100	
	3. Length appropriate?	15	15	N/A	100	**100%**
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	15	15	N/A	100	
	2. Downstream of meander (glide/inflection) centering?	15	15	N/A	100	**100%**
D. Meanders	1. Outer bend in state of limited/controlled erosion?	15	15	N/A	100	
	2. Of those eroding, # w/concomitant point bar formation?	N/A	N/A	N/A	N/A	
	3. Apparent Rc within spec?	15	15	N/A	100	
	4. Sufficient floodplain access and relief?	15	15	N/A	100	**100%**
E. Bed General	1. General channel bed aggradation areas (bar formation)	N/A	N/A	1/35	98	
	2. Channel bed degradation - areas of increasing down-cutting or head cutting?	N/A	N/A	3/130	94	**96%**
F. Bank	1. Actively eroding, wasting, or slumping bank	N/A	N/A	0/0	100	**100%**
G. Vanes	1. Free of back or arm scour?	9	10	N/A	90	
	2. Height appropriate?	8	10	N/A	80	
	3. Angle and geometry appear appropriate?	10	10	N/A	100	
	4. Free of piping or other structural failures?	10	10	N/A	100	**93%**
H. Wads/ Boulders	1. Free of scour?	15	16	N/A	94	
	2. Footing stable?	15	16	N/A	94	**94%**

Table B2. Visual Morphological Stability Assessment
Big Cedar Creek Restoration Site: Project No. D06054-D

BCC Reach 3 (1823 LF)

Feature Category	Metric (per As-Built and reference baselines)	(# Stable) Number Performing as Intended	Total number per As-Built	Total Number / feet in unstable state	% Performing in Stable Condition	Feature Perfomance Mean or Total
A. Riffles	1. Present?	12	13	N/A	92	
	2. Armor stable (e.g. no displacement)?	12	13	N/A	92	
	3. Facet grades appears stable?	13	13	N/A	100	
	4. Minimal evidence of embedding/fining?	13	13	N/A	100	
	5. Length appropriate?	13	13	N/A	100	**97%**
B. Pools	1. Present? (e.g. not subject to severe aggradation or migration?)	13	13	N/A	100	
	2. Sufficiently deep (Max Pool D:Mean Bkf >1.6?)	13	13	N/A	100	
	3. Length appropriate?	13	13	N/A	100	**100%**
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	13	13	N/A	100	
	2. Downstream of meander (glide/inflection) centering?	13	13	N/A	100	**100%**
D. Meanders	1. Outer bend in state of limited/controlled erosion?	13	13	N/A	100	
	2. Of those eroding, # w/concomitant point bar formation?	N/A	N/A	N/A	N/A	
	3. Apparent Rc within spec?	13	13	N/A	100	
	4. Sufficient floodplain access and relief?	13	13	N/A	100	**100%**
E. Bed General	1. General channel bed aggradation areas (bar formation)	N/A	N/A	0/0	100	
	2. Channel bed degradation - areas of increasing down-cutting or head cutting?	N/A	N/A	0/0	100	**100%**
F. Bank	1. Actively eroding, wasting, or slumping bank	N/A	N/A	2/105	94	**94%**
G. Vanes	1. Free of back or arm scour?	11	12	N/A	92	
	2. Height appropriate?	11	12	N/A	92	
	3. Angle and geometry appear appropriate?	12	12	N/A	100	
	4. Free of piping or other structural failures?	12	12	N/A	100	**96%**
H. Wads/ Boulders	1. Free of scour?	11	11	N/A	100	
	2. Footing stable?	11	11	N/A	100	**100%**

BCC Reach 4 (410 LF)

Feature Category	Metric (per As-Built and reference baselines)	(# Stable) Number Performing as Intended	Total number per As-Built	Total Number / feet in unstable state	% Performing in Stable Condition	Feature Perfomance Mean or Total
A. Riffles	1. Present?	4	4	N/A	100	
	2. Armor stable (e.g. no displacement)?	4	4	N/A	100	
	3. Facet grades appears stable?	4	4	N/A	100	
	4. Minimal evidence of embedding/fining?	4	4	N/A	100	
	5. Length appropriate?	4	4	N/A	100	**100%**
B. Pools	1. Present? (e.g. not subject to severe aggradation or migration?)	3	3	N/A	100	
	2. Sufficiently deep (Max Pool D:Mean Bkf >1.6?)	3	3	N/A	100	
	3. Length appropriate?	3	3	N/A	100	**100%**
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	3	3	N/A	100	
	2. Downstream of meander (glide/inflection) centering?	3	3	N/A	100	**100%**
D. Meanders	1. Outer bend in state of limited/controlled erosion?	2	3	N/A	67	
	2. Of those eroding, # w/concomitant point bar formation?	1	1	N/A	100	
	3. Apparent Rc within spec?	3	3	N/A	100	
	4. Sufficient floodplain access and relief?	3	3	N/A	100	**92%**
E. Bed General	1. General channel bed aggradation areas (bar formation)	N/A	N/A	1/20	95	
	2. Channel bed degradation - areas of increasing down-cutting or head cutting?	N/A	N/A	0	100	**98%**
F. Bank	1. Actively eroding, wasting, or slumping bank	N/A	N/A	2/50	88	**88%**
G. Vanes	1. Free of back or arm scour?	2	2	N/A	100	
	2. Height appropriate?	2	2	N/A	100	
	3. Angle and geometry appear appropriate?	2	2	N/A	100	
	4. Free of piping or other structural failures?	2	2	N/A	100	**100%**
H. Wads/ Boulders	1. Free of scour?	3	3	N/A	100	
	2. Footing stable?	3	3	N/A	100	**100%**

Table B2. Visual Morphological Stability Assessment
Big Cedar Creek Restoration Site: Project No. D06054-D

BCC Reach 6 (969 LF)

Feature Category	Metric (per As-Built and reference baselines)	(# Stable) Number Performing as Intended	Total number per As-Built	Total Number / feet in unstable state	% Performing in Stable Condition	Feature Perfomance Mean or Total
A. Riffles	1. Present?	4	4	N/A	100	
	2. Armor stable (e.g. no displacement)?	4	4	N/A	100	
	3. Facet grades appears stable?	4	4	N/A	100	
	4. Minimal evidence of embedding/fining?	4	4	N/A	100	
	5. Length appropriate?	4	4	N/A	100	**100%**
B. Pools	1. Present? (e.g. not subject to severe aggradation or migration?)	4	4	N/A	100	
	2. Sufficiently deep (Max Pool D:Mean Bkf >1.6?)	4	4	N/A	100	
	3. Length appropriate?	4	4	N/A	100	**100%**
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	3	3	N/A	100	
	2. Downstream of meander (glide/inflection) centering?	3	3	N/A	100	**100%**
D. Meanders	1. Outer bend in state of limited/controlled erosion?	3	3	N/A	100	
	2. Of those eroding, # w/concomitant point bar formation?	N/A	N/A	N/A	N/A	
	3. Apparent Rc within spec?	N/A	N/A	N/A	N/A	
	4. Sufficient floodplain access and relief?	3	3	N/A	100	**100%**
E. Bed General	1. General channel bed aggradation areas (bar formation)	N/A	N/A	0/0	100	
	2. Channel bed degradation - areas of increasing down-cutting or head cutting?	N/A	N/A	0/0	100	**100%**
F. Bank	1. Actively eroding, wasting, or slumping bank	N/A	N/A	0/0	100	**100%**
G. Vanes	1. Free of back or arm scour?	2	2	N/A	100	
	2. Height appropriate?	2	2	N/A	100	
	3. Angle and geometry appear appropriate?	2	2	N/A	100	
	4. Free of piping or other structural failures?	2	2	N/A	100	**100%**
H. Wads/ Boulders	1. Free of scour?	N/A	N/A	N/A	N/A	**N/A**
	2. Footing stable?	N/A	N/A	N/A	N/A	**N/A**

UT1 Reach 1 (1247 LF)

Feature Category	Metric (per As-Built and reference baselines)	(# Stable) Number Performing as Intended	Total number per As-Built	Total Number / feet in unstable state	% Performing in Stable Condition	Feature Perfomance Mean or Total
A. Riffles	1. Present?	13	13	N/A	100	
	2. Armor stable (e.g. no displacement)?	13	13	N/A	100	
	3. Facet grades appears stable?	13	13	N/A	100	
	4. Minimal evidence of embedding/fining?	13	13	N/A	100	
	5. Length appropriate?	13	13	N/A	100	**100%**
B. Pools	1. Present? (e.g. not subject to severe aggradation or migration?)	13	13	N/A	100	
	2. Sufficiently deep (Max Pool D:Mean Bkf >1.6?)	13	13	N/A	100	
	3. Length appropriate?	13	13	N/A	100	**100%**
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	13	13	N/A	100	
	2. Downstream of meander (glide/inflection) centering?	13	13	N/A	100	**100%**
D. Meanders	1. Outer bend in state of limited/controlled erosion?	13	13	N/A	100	
	2. Of those eroding, # w/concomitant point bar formation?	N/A	N/A	N/A	N/A	
	3. Apparent Rc within spec?	13	13	N/A	100	
	4. Sufficient floodplain access and relief?	13	13	N/A	100	**100%**
E. Bed General	1. General channel bed aggradation areas (bar formation)	N/A	N/A	0/0	100	
	2. Channel bed degradation - areas of increasing down-cutting or head cutting?	N/A	N/A	0/0	100	**100%**
F. Bank	1. Actively eroding, wasting, or slumping bank	N/A	N/A	0/0	100	**100%**
G. Vanes	1. Free of back or arm scour?	N/A	N/A	N/A	N/A	
	2. Height appropriate?	N/A	N/A	N/A	N/A	
	3. Angle and geometry appear appropriate?	N/A	N/A	N/A	N/A	
	4. Free of piping or other structural failures?	N/A	N/A	N/A	N/A	**N/A**
H. Wads/ Boulders	1. Free of scour?	3	3	N/A	100	
	2. Footing stable?	3	3	N/A	100	**100%**

Table B2. Visual Morphological Stability Assessment
Big Cedar Creek Restoration Site: Project No. D06054-D

UT1 Reach 2 (1016 LF)

Feature Category	Metric (per As-Built and reference baselines)	(# Stable) Number Performing as Intended	Total number per As-Built	Total Number / feet in unstable state	% Performing in Stable Condition	Feature Perfomance Mean or Total
A. Riffles	1. Present?	9	9	N/A	100	
	2. Armor stable (e.g. no displacement)?	9	9	N/A	100	
	3. Facet grades appears stable?	9	9	N/A	100	
	4. Minimal evidence of embedding/fining?	9	9	N/A	100	
	5. Length appropriate?	9	9	N/A	100	**100%**
B. Pools	1. Present? (e.g. not subject to severe aggradation or migration?)	11	11	N/A	100	
	2. Sufficiently deep (Max Pool D:Mean Bkf >1.6?)	11	11	N/A	100	
	3. Length appropriate?	11	11	N/A	100	**100%**
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	11	11	N/A	100	
	2. Downstream of meander (glide/inflection) centering?	11	11	N/A	100	**100%**
D. Meanders	1. Outer bend in state of limited/controlled erosion?	11	11	N/A	100	
	2. Of those eroding, # w/concomitant point bar formation?	N/A	N/A	N/A	N/A	
	3. Apparent Rc within spec?	11	11	N/A	100	
	4. Sufficient floodplain access and relief?	11	11	N/A	100	**100%**
E. Bed General	1. General channel bed aggradation areas (bar formation)	N/A	N/A	0/0	100	
	2. Channel bed degradation - areas of increasing down-cutting or head cutting?	N/A	N/A	0/0	100	**100%**
F. Bank	1. Actively eroding, wasting, or slumping bank	N/A	N/A	0/0	100	**100%**
G. Vanes	1. Free of back or arm scour?	2	2	N/A	100	
	2. Height appropriate?	2	2	N/A	100	
	3. Angle and geometry appear appropriate?	2	2	N/A	100	
	4. Free of piping or other structural failures?	2	2	N/A	100	**100%**
H. Wads/ Boulders	1. Free of scour?	5	5	N/A	100	
	2. Footing stable?	5	5	N/A	100	**100%**

UT1 Reach 3 (1885 LF)

Feature Category	Metric (per As-Built and reference baselines)	(# Stable) Number Performing as Intended	Total number per As-Built	Total Number / feet in unstable state	% Performing in Stable Condition	Feature Perfomance Mean or Total
A. Riffles	1. Present?	17	18	N/A	94	
	2. Armor stable (e.g. no displacement)?	17	18	N/A	94	
	3. Facet grades appears stable?	18	18	N/A	100	
	4. Minimal evidence of embedding/fining?	18	18	N/A	100	
	5. Length appropriate?	18	18	N/A	100	**98%**
B. Pools	1. Present? (e.g. not subject to severe aggradation or migration?)	19	19	N/A	100	
	2. Sufficiently deep (Max Pool D:Mean Bkf >1.6?)	19	19	N/A	100	
	3. Length appropriate?	19	19	N/A	100	**100%**
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	19	19	N/A	100	
	2. Downstream of meander (glide/inflection) centering?	19	19	N/A	100	**100%**
D. Meanders	1. Outer bend in state of limited/controlled erosion?	19	19	N/A	100	
	2. Of those eroding, # w/concomitant point bar formation?	N/A	N/A	N/A	N/A	
	3. Apparent Rc within spec?	19	19	N/A	100	
	4. Sufficient floodplain access and relief?	19	19	N/A	100	**100%**
E. Bed General	1. General channel bed aggradation areas (bar formation)	N/A	N/A	0/0	100	
	2. Channel bed degradation - areas of increasing down-cutting or head cutting?	N/A	N/A	0/0	100	**100%**
F. Bank	1. Actively eroding, wasting, or slumping bank	N/A	N/A	2/60	97	**97%**
G. Vanes	1. Free of back or arm scour?	12	12	N/A	100	
	2. Height appropriate?	12	12	N/A	100	
	3. Angle and geometry appear appropriate?	12	12	N/A	100	
	4. Free of piping or other structural failures?	12	12	N/A	100	**100%**
H. Wads/ Boulders	1. Free of scour?	11	11	N/A	100	
	2. Footing stable?	11	11	N/A	100	**100%**

Table B2. Visual Morphological Stability Assessment
Big Cedar Creek Restoration Site: Project No. D06054-D

UT1 Reach 4 (997 LF)

Feature Category	Metric (per As-Built and reference baselines)	(# Stable) Number Performing as Intended	Total number per As-Built	Total Number / feet in unstable state	% Performing in Stable Condition	Feature Perfomance Mean or Total
A. Riffles	1. Present?	6	9	N/A	67	
	2. Armor stable (e.g. no displacement)?	6	9	N/A	67	
	3. Facet grades appears stable?	9	9	N/A	100	
	4. Minimal evidence of embedding/fining?	9	9	N/A	100	
	5. Length appropriate?	9	9	N/A	100	**87%**
B. Pools	1. Present? (e.g. not subject to severe aggradation or migration?)	7	7	N/A	100	
	2. Sufficiently deep (Max Pool D:Mean Bkf >1.6?)	5	7	N/A	71	
	3. Length appropriate?	7	7	N/A	100	**90%**
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	7	7	N/A	100	
	2. Downstream of meander (glide/inflection) centering?	7	7	N/A	100	**100%**
D. Meanders	1. Outer bend in state of limited/controlled erosion?	7	7	N/A	100	
	2. Of those eroding, # w/concomitant point bar formation?	N/A	N/A	N/A	N/A	
	3. Apparent Rc within spec?	7	7	N/A	100	
	4. Sufficient floodplain access and relief?	7	7	N/A	100	**100%**
E. Bed General	1. General channel bed aggradation areas (bar formation)	N/A	N/A	0/0	100	
	2. Channel bed degradation - areas of increasing down-cutting or head cutting?	N/A	N/A	2/235	76	**76%**
F. Bank	1. Actively eroding, wasting, or slumping bank	N/A	N/A	6/95	90	**90%**
G. Vanes	1. Free of back or arm scour?	1	1	N/A	100	
	2. Height appropriate?	1	1	N/A	100	
	3. Angle and geometry appear appropriate?	1	1	N/A	100	
	4. Free of piping or other structural failures?	1	1	N/A	100	**100%**
H. Wads/ Boulders	1. Free of scour?	5	5	N/A	100	
	2. Footing stable?	5	5	N/A	100	**100%**

UT1A (85 LF)

Feature Category	Metric (per As-Built and reference baselines)	(# Stable) Number Performing as Intended	Total number per As-Built	Total Number / feet in unstable state	% Performing in Stable Condition	Feature Perfomance Mean or Total
A. Riffles	1. Present?	N/A	N/A	N/A	N/A	
	2. Armor stable (e.g. no displacement)?	N/A	N/A	N/A	N/A	
	3. Facet grades appears stable?	N/A	N/A	N/A	N/A	
	4. Minimal evidence of embedding/fining?	N/A	N/A	N/A	N/A	
	5. Length appropriate?	N/A	N/A	N/A	N/A	**N/A**
B. Pools	1. Present? (e.g. not subject to severe aggradation or migration?)	N/A	N/A	N/A	N/A	
	2. Sufficiently deep (Max Pool D:Mean Bkf >1.6?)	N/A	N/A	N/A	N/A	
	3. Length appropriate?	N/A	N/A	N/A	N/A	**N/A**
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	N/A	N/A	N/A	N/A	
	2. Downstream of meander (glide/inflection) centering?	N/A	N/A	N/A	N/A	**N/A**
D. Meanders	1. Outer bend in state of limited/controlled erosion?	N/A	N/A	N/A	N/A	
	2. Of those eroding, # w/concomitant point bar formation?	N/A	N/A	N/A	N/A	
	3. Apparent Rc within spec?	N/A	N/A	N/A	N/A	
	4. Sufficient floodplain access and relief?	N/A	N/A	N/A	N/A	**N/A**
E. Bed General	1. General channel bed aggradation areas (bar formation)	N/A	N/A	0/0	100	
	2. Channel bed degradation - areas of increasing down-cutting or head cutting?	N/A	N/A	0/0	100	**100%**
F. Bank	1. Actively eroding, wasting, or slumping bank	N/A	N/A	0/0	100	**100%**
G. Vanes	1. Free of back or arm scour?	N/A	N/A	N/A	N/A	
	2. Height appropriate?	N/A	N/A	N/A	N/A	
	3. Angle and geometry appear appropriate?	N/A	N/A	N/A	N/A	
	4. Free of piping or other structural failures?	N/A	N/A	N/A	N/A	**N/A**
H. Wads/ Boulders	1. Free of scour?	N/A	N/A	N/A	N/A	
	2. Footing stable?	N/A	N/A	N/A	N/A	**N/A**

Table B2. Visual Morphological Stability Assessment
Big Cedar Creek Restoration Site: Project No. D06054-D

UT1B (34 LF)

Feature Category	Metric (per As-Built and reference baselines)	(# Stable) Number Performing as Intended	Total number per As-Built	Total Number / feet in unstable state	% Performing in Stable Condition	Feature Perfomance Mean or Total
A. Riffles	1. Present?	N/A	N/A	N/A	N/A	
	2. Armor stable (e.g. no displacement)?	N/A	N/A	N/A	N/A	
	3. Facet grades appears stable?	N/A	N/A	N/A	N/A	
	4. Minimal evidence of embedding/fining?	N/A	N/A	N/A	N/A	
	5. Length appropriate?	N/A	N/A	N/A	N/A	**N/A**
B. Pools	1. Present? (e.g. not subject to severe aggradation or migration?)	N/A	N/A	N/A	N/A	
	2. Sufficiently deep (Max Pool D:Mean Bkf >1.6?)	N/A	N/A	N/A	N/A	
	3. Length appropriate?	N/A	N/A	N/A	N/A	**N/A**
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	N/A	N/A	N/A	N/A	
	2. Downstream of meander (glide/inflection) centering?	N/A	N/A	N/A	N/A	**N/A**
D. Meanders	1. Outer bend in state of limited/controlled erosion?	N/A	N/A	N/A	N/A	
	2. Of those eroding, # w/concomitant point bar formation?	N/A	N/A	N/A	N/A	
	3. Apparent Rc within spec?	N/A	N/A	N/A	N/A	
	4. Sufficient floodplain access and relief?	N/A	N/A	N/A	N/A	**N/A**
E. Bed General	1. General channel bed aggradation areas (bar formation)	N/A	N/A	0/0	100	
	2. Channel bed degradation - areas of increasing down-cutting or head cutting?	N/A	N/A	0/0	100	**100%**
F. Bank	1. Actively eroding, wasting, or slumping bank	N/A	N/A	0/0	100	**100%**
G. Vanes	1. Free of back or arm scour?	1	1	N/A	100	
	2. Height appropriate?	1	1	N/A	100	
	3. Angle and geometry appear appropriate?	1	1	N/A	100	
	4. Free of piping or other structural failures?	1	1	N/A	100	**100%**
H. Wads/ Boulders	1. Free of scour?	N/A	N/A	N/A	N/A	
	2. Footing stable?	N/A	N/A	N/A	N/A	**N/A**

UT1C (78 LF)

Feature Category	Metric (per As-Built and reference baselines)	(# Stable) Number Performing as Intended	Total number per As-Built	Total Number / feet in unstable state	% Performing in Stable Condition	Feature Perfomance Mean or Total
A. Riffles	1. Present?	N/A	N/A	N/A	N/A	
	2. Armor stable (e.g. no displacement)?	N/A	N/A	N/A	N/A	
	3. Facet grades appears stable?	N/A	N/A	N/A	N/A	
	4. Minimal evidence of embedding/fining?	N/A	N/A	N/A	N/A	
	5. Length appropriate?	N/A	N/A	N/A	N/A	**N/A**
B. Pools	1. Present? (e.g. not subject to severe aggradation or migration?)	N/A	N/A	N/A	N/A	
	2. Sufficiently deep (Max Pool D:Mean Bkf >1.6?)	N/A	N/A	N/A	N/A	
	3. Length appropriate?	N/A	N/A	N/A	N/A	**N/A**
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	N/A	N/A	N/A	N/A	
	2. Downstream of meander (glide/inflection) centering?	N/A	N/A	N/A	N/A	**N/A**
D. Meanders	1. Outer bend in state of limited/controlled erosion?	N/A	N/A	N/A	N/A	
	2. Of those eroding, # w/concomitant point bar formation?	N/A	N/A	N/A	N/A	
	3. Apparent Rc within spec?	N/A	N/A	N/A	N/A	
	4. Sufficient floodplain access and relief?	N/A	N/A	N/A	N/A	**N/A**
E. Bed General	1. General channel bed aggradation areas (bar formation)	N/A	N/A	0/0	100	
	2. Channel bed degradation - areas of increasing down-cutting or head cutting?	N/A	N/A	0/0	100	**100%**
F. Bank	1. Actively eroding, wasting, or slumping bank	N/A	N/A	0/0	100	**100%**
G. Vanes	1. Free of back or arm scour?	N/A	N/A	N/A	N/A	
	2. Height appropriate?	N/A	N/A	N/A	N/A	
	3. Angle and geometry appear appropriate?	N/A	N/A	N/A	N/A	
	4. Free of piping or other structural failures?	N/A	N/A	N/A	N/A	**N/A**
H. Wads/ Boulders	1. Free of scour?	N/A	N/A	N/A	N/A	
	2. Footing stable?	N/A	N/A	N/A	N/A	**N/A**

Table B2. Visual Morphological Stability Assessment
Big Cedar Creek Restoration Site: Project No. D06054-D

UT2 (609 LF)

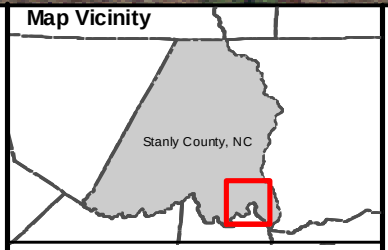
Feature Category	Metric (per As-Built and reference baselines)	(# Stable) Number Performing as Intended	Total number per As-Built	Total Number / feet in unstable state	% Performing in Stable Condition	Feature Perfomance Mean or Total
A. Riffles	1. Present?	8	8	N/A	100	
	2. Armor stable (e.g. no displacement)?	8	8	N/A	100	
	3. Facet grades appears stable?	8	8	N/A	100	
	4. Minimal evidence of embedding/fining?	8	8	N/A	100	
	5. Length appropriate?	8	8	N/A	100	**100%**
B. Pools	1. Present? (e.g. not subject to severe aggradation or migration?)	8	8	N/A	100	
	2. Sufficiently deep (Max Pool D:Mean Bkf >1.6?)	8	8	N/A	100	
	3. Length appropriate?	8	8	N/A	100	**100%**
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	7	7	N/A	100	
	2. Downstream of meander (glide/inflection) centering?	7	7	N/A	100	**100%**
D. Meanders	1. Outer bend in state of limited/controlled erosion?	7	7	N/A	100	
	2. Of those eroding, # w/concomitant point bar formation?	N/A	N/A	N/A	N/A	
	3. Apparent Rc within spec?	7	7	N/A	100	
	4. Sufficient floodplain access and relief?	7	7	N/A	100	**100%**
E. Bed General	1. General channel bed aggradation areas (bar formation)	N/A	N/A	0/0	100	
	2. Channel bed degradation - areas of increasing down-cutting or head cutting?	N/A	N/A	0/0	100	**100%**
F. Bank	1. Actively eroding, wasting, or slumping bank	N/A	N/A	0/0	100	**100%**
G. Vanes	1. Free of back or arm scour?	7	7	N/A	100	
	2. Height appropriate?	7	7	N/A	100	
	3. Angle and geometry appear appropriate?	7	7	N/A	100	
	4. Free of piping or other structural failures?	7	7	N/A	100	**100%**
H. Wads/ Boulders	1. Free of scour?	4	4	N/A	100	
	2. Footing stable?	4	4	N/A	100	**100%**

UT3 (73 LF within easement)

Feature Category	Metric (per As-Built and reference baselines)	(# Stable) Number Performing as Intended	Total number per As-Built	Total Number / feet in unstable state	% Performing in Stable Condition	Feature Perfomance Mean or Total
A. Riffles	1. Present?	N/A	N/A	N/A	N/A	
	2. Armor stable (e.g. no displacement)?	N/A	N/A	N/A	N/A	
	3. Facet grades appears stable?	N/A	N/A	N/A	N/A	
	4. Minimal evidence of embedding/fining?	N/A	N/A	N/A	N/A	
	5. Length appropriate?	N/A	N/A	N/A	N/A	**N/A**
B. Pools	1. Present? (e.g. not subject to severe aggradation or migration?)	N/A	N/A	N/A	N/A	
	2. Sufficiently deep (Max Pool D:Mean Bkf >1.6?)	N/A	N/A	N/A	N/A	
	3. Length appropriate?	N/A	N/A	N/A	N/A	**N/A**
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	N/A	N/A	N/A	N/A	
	2. Downstream of meander (glide/inflection) centering?	N/A	N/A	N/A	N/A	**N/A**
D. Meanders	1. Outer bend in state of limited/controlled erosion?	N/A	N/A	N/A	N/A	
	2. Of those eroding, # w/concomitant point bar formation?	N/A	N/A	N/A	N/A	
	3. Apparent Rc within spec?	N/A	N/A	N/A	N/A	
	4. Sufficient floodplain access and relief?	N/A	N/A	N/A	N/A	**N/A**
E. Bed General	1. General channel bed aggradation areas (bar formation)	N/A	N/A	0/0	100	
	2. Channel bed degradation - areas of increasing down-cutting or head cutting?	N/A	N/A	0/0	100	**100%**
F. Bank	1. Actively eroding, wasting, or slumping bank	N/A	N/A	0/0	100	**100%**
G. Vanes	1. Free of back or arm scour?	2	2	N/A	100	
	2. Height appropriate?	2	2	N/A	100	
	3. Angle and geometry appear appropriate?	2	2	N/A	100	
	4. Free of piping or other structural failures?	2	2	N/A	100	**100%**
H. Wads/ Boulders	1. Free of scour?	N/A	N/A	N/A	N/A	
	2. Footing stable?	N/A	N/A	N/A	N/A	**N/A**

Ecosystem Enhancement PROGRAM

Map Vicinity



EEP Project No. : D06054-D
February 2010

LEGEND

- AsBuilt Streambank
- AsBuilt Thalweg
- Conservation Easement

Channel Bed Conditions

- Aggradation
- Degradation

Bank Observations

- Bank Scour
- Raw Bank

In-Stream Structures

Figure B1: Stream Problem Areas
BCC (Station 10+00 to 27+00) & UT2

Big Cedar Creek Stream Restoration Project

Annual Monitoring Plan - Year 1

Stanly County, NC

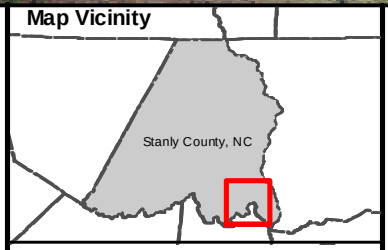
N

0 100 200 400 Feet

Baker

Ecosystem Enhancement PROGRAM

Map Vicinity



EEP Project No. : D06054-D
February 2010

LEGEND

- AsBuilt Streambank
- AsBuilt Thalweg
- Conservation Easement

Channel Bed Conditions

- Aggradation
- Degradation

Bank Observations

- Bank Scour
- Raw Bank
- In-Stream Structures

Figure B2: Stream Problem Areas
BCC (Station 27+00 to 45+00)

Big Cedar Creek Stream Restoration Project

Annual Monitoring Plan - Year 1

Stanly County, NC

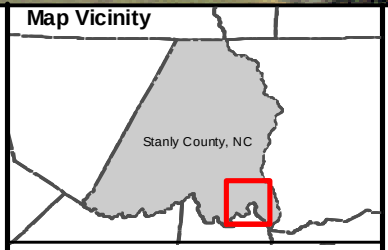
N

0 100 200 400 Feet

Baker

Ecosystem Enhancement PROGRAM

Map Vicinity



EEP Project No. : D06054-D
February 2010

LEGEND

- AsBuilt Streambank
- AsBuilt Thalweg
- Conservation Easement

Channel Bed Conditions

- Aggradation
- Degradation

Bank Observations

- Bank Scour
- Raw Bank
- In-Stream Structures

Figure B3: Stream Problem Areas
BCC (Station 48+00 to 63+00)

Big Cedar Creek Stream Restoration Project

Annual Monitoring Plan - Year 1

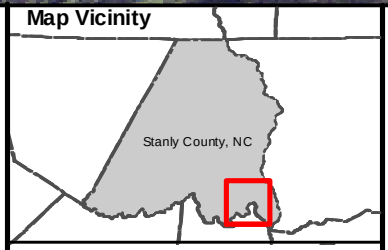
Stanly County, NC

0 100 200 400 Feet

Baker

Ecosystem Enhancement PROGRAM

Map Vicinity



EEP Project No. : D06054-D
February 2010

LEGEND

- AsBuilt Streambank
- AsBuilt Thalweg
- Conservation Easement

Channel Bed Conditions

- Aggradation
- Degradation

Bank Observations

- Bank Scour
- Raw Bank
- In-Stream Structures

Figure B4: Stream Problem Areas
UT1 (Station 37+00 to 43+00)

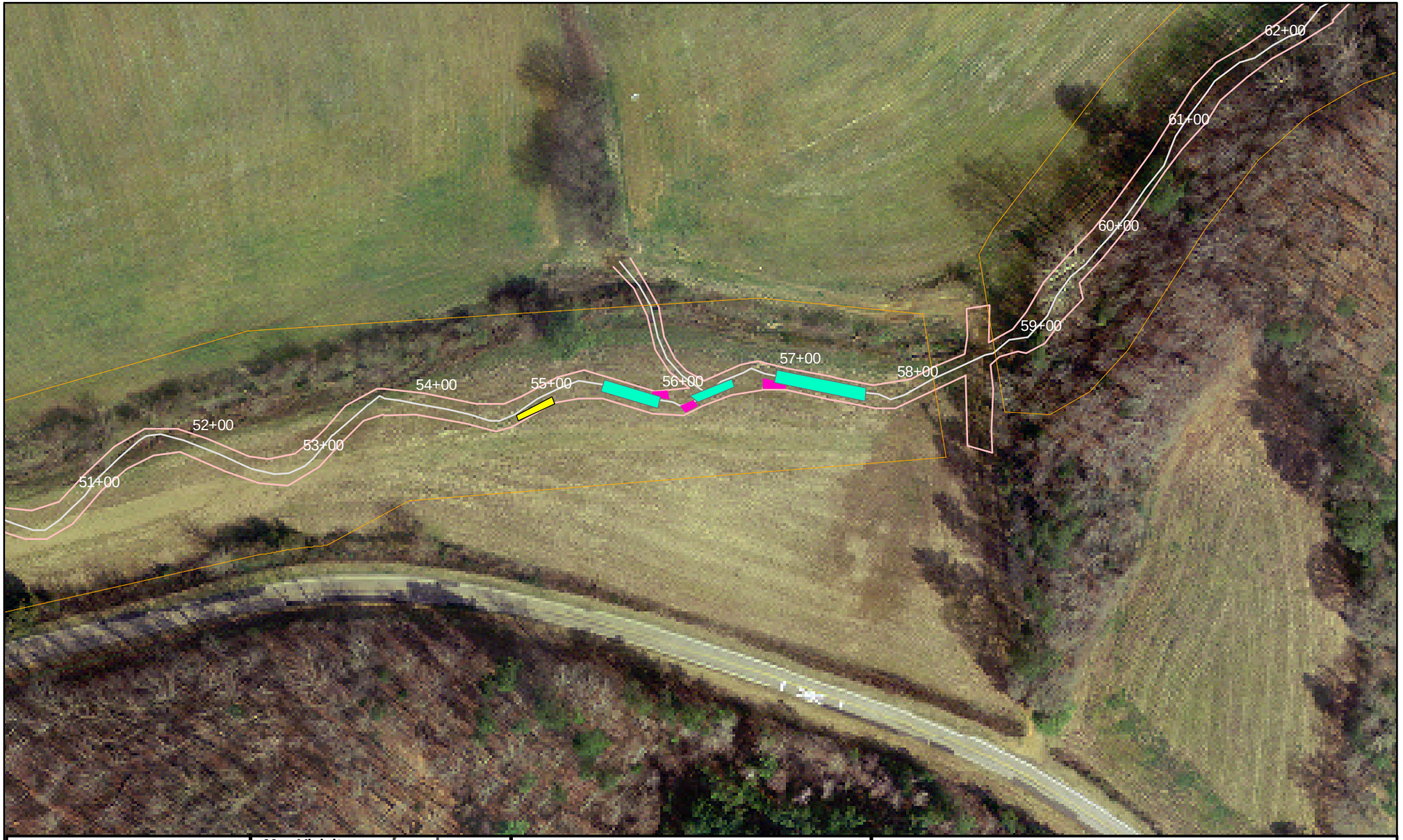
Big Cedar Creek Stream Restoration Project

Annual Monitoring Plan - Year 1

Stanly County, NC

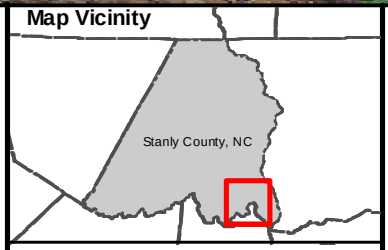
0 25 50 100 Feet

Baker



Ecosystem Enhancement PROGRAM

Map Vicinity



EEP Project No. : D06054-D
February 2010

LEGEND

- AsBuilt Streambank
- AsBuilt Thalweg
- Conservation Easement

Channel Bed Conditions

- Aggradation
- Degradation

Bank Observations

- Bank Scour
- Raw Bank
- In-Stream Structures

Figure B5: Stream Problem Areas
UT1 (Station 51+00 to 62+00)

Big Cedar Creek Stream Restoration Project

Annual Monitoring Plan - Year 1

Stanly County, NC

N

0 50 100 200 Feet

Baker

Representative Stream Problem Area Photos

SP1

SP2

SP3

SP 4

SP5

SP6

SP7

SP8

SP9

SP10

SP11

SP12

SP13

Appendix C

Vegetation Raw Data

Vegetation Data

Tables C.1 through C.7

Vegetation Monitoring Plot Photos

Vegetation Problem Areas Figures C1-C8

Vegetation Problem Area Photos

Table C.1. Vegetation Metadata

Big Cedar Creek Restoration Site: Project No. D06054-D

Report Prepared By	Ian Eckardt
Date Prepared	12/10/2009 16:08
database name	cvs-eep-entrytool-v2.2.7.mdb
database location	L:\Users\IEckardt\2009\Veg data tool
computer name	CHABWIECKARDT
file size	90476544

DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------

Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.

PROJECT SUMMARY----------

Project Code	92532
project Name	Big Cedar Creek
Description	Restoration Project
River Basin	Yadkin-Pee Dee
length(ft)	11661
stream-to-edge width (ft)	70
area (sq m)	151652.58
Required Plots (calculated)	23
Sampled Plots	23

Table C.2. Vegetation Vigor by Species

Big Cedar Creek Restoration Site: Project No. D06054-D									
	Species	**CommonName**	**4**	**3**	**2**	**1**	**0**	**Missing**	**Unknown**
	Betula nigra	river birch	11	12	29	12	8		
	Cornus amomum	silky dogwood	3	31	29	6			
	Corylus americana	American hazelnut			6	1	1		
	Fraxinus pennsylvanica	green ash	7	4	10	4			
	Ilex verticillata	common winterberry			15	5			
	Quercus michauxii	swamp chestnut oak		2	9	6	3		
	Quercus nigra	water oak		5	4	4	5		
	Quercus phellos	willow oak	2	15	16	7	1		
	Symphoricarpos orbiculatus	coralberry		1	1	2	1		
	Viburnum dentatum	southern arrowwood		5	2	8	2		
	Carpinus caroliniana	American hornbeam		5	17	14	6		
	Calycanthus floridus	eastern sweetshrub			13	2			
	Quercus rubra	northern red oak			1	2			
	Lindera benzoin	northern spicebush			3	19	12		
	Platanus occidentalis	American sycamore	21	34	8	12	7		
	Acer rubrum	red maple			41	1			
TOT:	**17**	**17**	**44**	**114**	**204**	**105**	**46**		

Table C.3. Vegetation Damage by Species

Big Cedar Creek Restoration Site: Project No. D06054-D

	Species	Common Name	Count of Damage Categories	No damage	Unknown	(other damage)
	Acer rubrum	red maple	0	1		
	Betula nigra	river birch	8	64	8	
	Calycanthus floridus	eastern sweetshrub	0	3		
	Carpinus caroliniana	American hornbeam	11	27	10	1
	Cornus amomum	silky dogwood	1	68	1	
	Corylus americana	American hazelnut	1	7	1	
	Fraxinus pennsylvanica	green ash	0	25		
	Ilex verticillata	common winterberry	4	16	3	1
	Lindera benzoin	northern spicebush	13	26	12	1
	Platanus occidentalis	American sycamore	10	105	9	1
	Quercus michauxii	swamp chestnut oak	3	17	3	
	Quercus nigra	water oak	5	13	5	
	Quercus phellos	willow oak	4	37	3	1
	Quercus rubra	northern red oak	0	5		
	Symphoricarpos orbiculatus	coralberry	1	4	1	
	Viburnum dentatum	southern arrowwood	2	32	2	
TOT:	**17**	**17**	**63**	**450**	**58**	**5**

Table C.4. Vegetation Damage by Plot

Big Cedar Creek Restoration Site: Project No. D06054-D						
	Plot	Count of Damage Categories	No Damage	Unknown	(other damage)	
	92532-01-0001-year:1	7	18	7		
	92532-01-0002-year:1	1	23	1		
	92532-01-0003-year:1	1	23	1		
	92532-01-0004-year:1	4	15	4		
	92532-01-0005-year:1	3	19	3		
	92532-01-0006-year:1	5	20	5		
	92532-01-0007-year:1	3	23	3		
	92532-01-0008-year:1	5	21	5		
	92532-01-0009-year:1	1	26	1		
	92532-01-0010-year:1	3	24	3		
	92532-01-0011-year:1	2	19	2		
	92532-01-0012-year:1	1	21	1		
	92532-01-0013-year:1	2	19	2		
	92532-01-0014-year:1	7	13	6	1	
	92532-01-0015-year:1	2	14	1	1	
	92532-01-0016-year:1	2	19	2		
	92532-01-0017-year:1	0	22			
	92532-01-0018-year:1	1	19	1		
	92532-01-0019-year:1	4	17	2	2	
	92532-01-0020-year:1	2	15	1	1	
	92532-01-0021-year:1	1	21	1		
	92532-01-0022-year:1	3	18	3		
	92532-01-0023-year:1	3	21	3		
TOT:	**23**	**63**	**450**	**58**	**5**	

Table C.5. Planted Stems by Plot and Species

Big Cedar Creek Restoration Site: Project No. D06054-D

Comment	Species	Common Name	Total Planted Stems	# plots	avg# stems	plot 92532-01-0001-year:1	plot 92532-01-0002-year:1	plot 92532-01-0003-year:1	plot 92532-01-0004-year:1	plot 92532-01-0005-year:1	plot 92532-01-0006-year:1	plot 92532-01-0007-year:1	plot 92532-01-0008-year:1	plot 92532-01-0009-year:1	plot 92532-01-0010-year:1	plot 92532-01-0011-year:1	plot 92532-01-0012-year:1	plot 92532-01-0013-year:1	plot 92532-01-0014-year:1	plot 92532-01-0015-year:1	plot 92532-01-0016-year:1	plot 92532-01-0017-year:1	plot 92532-01-0018-year:1	plot 92532-01-0019-year:1	plot 92532-01-0020-year:1	plot 92532-01-0021-year:1	plot 92532-01-0022-year:1	plot 92532-01-0023-year:1
	Acer rubrum	red maple	1	1	1						1																	
	Betula nigra	river birch	64	21	3	1	5	4	4	4		3	1	5	2	2	2	1	1	3	4	2	5	4	3		3	5
	Calycanthus floridus	eastern sweetshrub	3	3	1							1				1					1							
	Carpinus caroliniana	American hornbeam	32	14	2	4	3		1			1		2				6	3	1	1	3	1	3	2			1
	Cornus amomum	silky dogwood	69	22	3	3	4	1	1	5	5	5	4	2	3	7	3	6	3	1	4	1	3	1		4	2	1
	Corylus americana	American hazelnut	7	3	2								4			2	1											
	Fraxinus pennsylvanica	green ash	25	14	2		1	1			4	1	2	1	4	1	2				1			2		3	1	1
	Ilex verticillata	common winterberry	20	11	2				1							2	1		5	1	1	1		1		2	4	1
	Lindera benzoin	northern spicebush	27	13	2	3	1	3					3	1	3					3	1		2		1	2	1	3
	Platanus occidentalis	American sycamore	108	22	5	6	6	9	7	2	4	5	4	6	9	5	7	5	4	2	4	10	2	7	2	1	1	
	Quercus michauxii	swamp chestnut oak	17	7	2				1		3	5		2	1												2	3
	Quercus nigra	water oak	13	7	2							1								1	2	3	1			3		2
	Quercus phellos	willow oak	40	14	3			2	2	6	2	1	1	4						3			5	1	7	2	2	2
	Quercus rubra	northern red oak	5	5	1		1	1		1	1											1						
	Symphoricarpos orbiculat	coralberry	4	4	1									1	1	1	1											
	Viburnum dentatum	southern arrowwood	30	16	2	2	2	2		1	2		2	1	1		3	2	2		1				1	4	2	2
	Viburnum dilatatum	linden arrowwood	2	1	2									2														
TOT:	**17**	**17**	**467**	**17**		**19**	**23**	**23**	**17**	**19**	**21**	**23**	**22**	**27**	**24**	**20**	**21**	**20**	**18**	**15**	**19**	**22**	**19**	**19**	**16**	**21**	**18**	**21**

Table C.6. Vegetative Problem Areas

BCC			
Feature/Issue	Station # / Range	Probable Cause	Photo #
Bare Bank	25+80	Unknown	VPA-1
	32+40	Matting torn away	
	48+50	Matting torn away	
	57+90	Erosion due to overland flow during storm event	
Bare Bench			
Bare Floodplain			
Invasive/Exotic Populations	30+40, Left floodplain	Ligustrum: persisting after construction	VPA-2
	63+00 - 67+00, Right floodplain	Ligustrum: persisting after construction	
	69+20 - 72+00, Right floodplain	Ligustrum: persisting after construction	
	73+00 - 75+00, Right floodplain	Ligustrum: persisting after construction	
UT1			
Feature/Issue	Station # / Range	Probable Cause	Photo #
Bare Bank	40+15	Matting pulled up	VPA-3
	56+00	Matting pulled up	
	56+25	Matting pulled up	
	56+50	Overland flow damaged matting	
Bare Bench			
Bare Floodplain	10+90, Right floodplain	Small wash out due to concentrated flow from offsite	VPA-4
	11+20, Right floodplain	Rocky soils not suitable for species	
	15+50, Left floodplain	Wash out due to storm event	
	20+80, Right floodplain	Stormwater discharge from Mt. Zion Church Rd.	VPA-5
	28+00, Right floodplain	Rocky soils not suitable for species	VPA-6
	31+40, Right floodplain	Rocky soils not suitable for species	
	32+50, Right floodplain	Rocky soils not suitable for species	
	43+10 - 43+70, Left top of bank	Rocky soils not suitable for species	VPA-7
	43+90 - 44+10, Right top of bank	Rocky soils not suitable for species	
	44+20 - 44+60, Right top of bank	Rocky soils not suitable for species	
Invasive/Exotic Populations	29+25, Right floodplain	Ligustrum	VPA-8
	59+25 - 60+25, Left floodplain	Ligustrum & multiflora rose: Persisting after construction	
	62+50 - 62+90, Right floodplain	Ligustrum: persisting after construction	
UT2			
Feature/Issue	Station # / Range	Probable Cause	Photo #
Bare Bank			
Bare Bench			
Bare Floodplain			
Invasive/Exotic Populations	Above 10+00 but within easement	Ligustrum: persisting after construction	VPA-9

Table C.7. Plot Species and Densities

Big Cedar Creek Restoration Site Contract No. D06054-D																									
Tree Species	**Plots**																							**Year 1 Totals**	**Average**
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
Acer rubrum							1																	1	
Betula nigra	1	5	4	4	4		3	1	5	2	2	2	1	1	3	4	2	5	4	3		3	5	64	
Calycanthus floridus								1				1					1							3	
Capinus caroliniana	4	3		1			1		2				6	3	1	1	3	1	3	2			1	32	
Cornus amomum	3	4	1	1	5	5	5	4	2	3	7	3	6	3	1	4	1	3	1		4	2	1	69	
Corylus americana								4			2	1												7	
Fraxinus pennsylvanica		1	1			4	1	2	1	4	1	2				1			2		3	1	1	25	
Ilex verticillata				1							2	1		5	1	1	1		1		2	4	1	20	
Lindera benzoin	3	1	3					3	1	3					3	1		2		1	2	1	3	27	
Platanus occidentalis	6	6	9	7	2	4	5	4	6	9	5	7	5	4	2	4	10	2	7	2	1	1		108	
Quercus michauxii				1		3	5		2	1												2	3	17	
Quercus nigra							1								1	2	3	1			3		2	13	
Quercus phellos			2	2	6	2	1	1	4						3			5	1	7	2	2	2	40	
Quercus rubra		1	1		1	1											1							5	
Symphoricarpos obiculatus									1	1	1	1												4	
Viburnum dentatum	2	2	2		1	2		2	3	1		3	2	2		1				1	4	2	2	32	
Stems/plot	19	23	23	17	19	21	23	22	27	24	20	21	20	18	15	19	22	19	19	16	21	18	21	467	
Stems/acre Year 1	769	931	931	688	769	850	931	890	1092	971	809	850	809	728	607	769	890	769	769	647	850	728	850	N/A	822
Stems/acre Initial	1000	960	960	760	880	1000	1040	1040	1080	1080	840	880	840	800	640	840	880	800	840	680	880	840	960		892

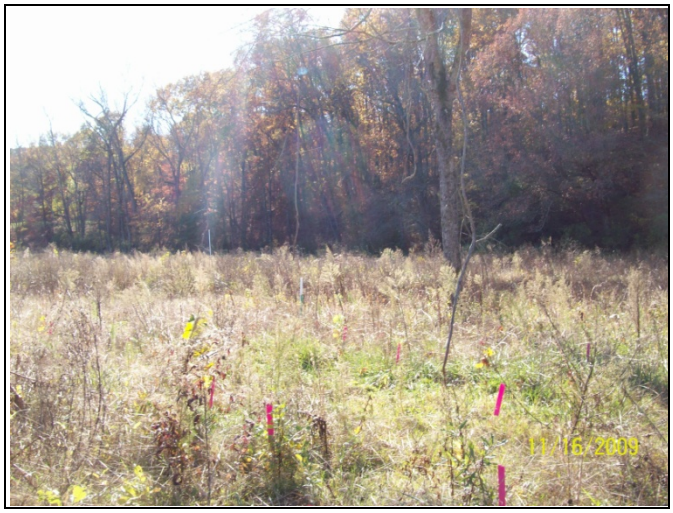
* As-built stems/acre were calculated by multiplying the number of live stems by a factor of 40. Year 1 stems/acre were calculated using a factor of 40.5. Therefore Plots 9 and 16 have higher Year 1 counts.

Vegetation Monitoring Plot Photos

Veg Plot 1

Veg Plot 2

Veg Plot 3



Veg Plot 4

Veg Plot 5

Veg Plot 6

Veg Plot 7

Veg Plot 8

Veg Plot 9

Veg Plot 10

Veg Plot 11

Veg Plot 12

Veg Plot 13

Veg Plot 14

Veg Plot 15

Veg Plot 16

Veg Plot 17

Veg Plot 18

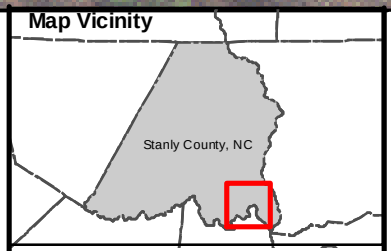
Veg Plot 19

Veg Plot 20

Veg Plot 21

Veg Plot 22

Map Vicinity



EEP Project No. : D06054-D
February 2010

LEGEND

- Asbuilt Streambank
- Conservation Easement
- Bare Bank
- Bare Floodplain
- Invasives
- Veg Plots
- Veg Plot Photos

Figure C1: Vegetation Problem Areas
BCC (Station 10+00 to 18+00) & UT2

Big Cedar Creek Stream Restoration Project

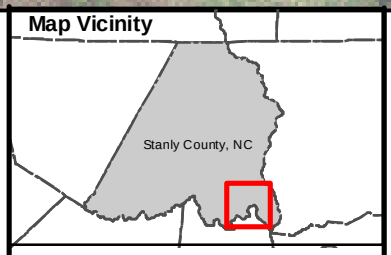
Annual Monitoring Plan - Year 1

Stanly County, NC

0 50 100 200 Feet

Ecosystem Enhancement PROGRAM

Map Vicinity



EEP Project No. : D06054-D
February 2010

LEGEND

- Asbuilt Streambank
- Conservation Easement
- Bare Bank
- Bare Floodplain
- Invasives
- Veg Plots
- Veg Plot Photos

Figure C2: Vegetation Problem Areas
BCC (Station 25+00 to 33+00)

Big Cedar Creek Stream Restoration Project

Annual Monitoring Plan - Year 1

Stanly County, NC

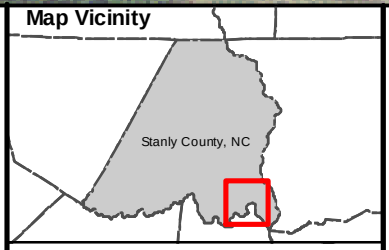
N

0 50 100 200 Feet

Baker

Ecosystem Enhancement Program

Map Vicinity



EEP Project No. : D06054-D
February 2010

LEGEND

- Asbuilt Streambank
- Conservation Easement
- Bare Bank
- Bare Floodplain
- Invasives
- Veg Plots
- Veg Plot Photos

Figure C3: Vegetation Problem Areas
BCC (Station 48+00 to 59+00)

Big Cedar Creek Stream Restoration Project

Annual Monitoring Plan - Year 1

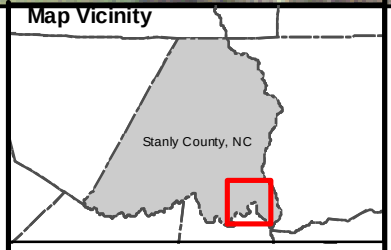
Stanly County, NC

0 50 100 200 Feet

Baker

Ecosystem Enhancement PROGRAM

Map Vicinity



EEP Project No. : D06054-D
February 2010

LEGEND

- Asbuilt Streambank
- Conservation Easement
- Bare Bank
- Bare Floodplain
- Invasives
- Veg Plots
- Veg Plot Photos

Figure C4: Vegetation Problem Areas
BCC (Station 61+00 to 68+00)

Big Cedar Creek Stream Restoration Project

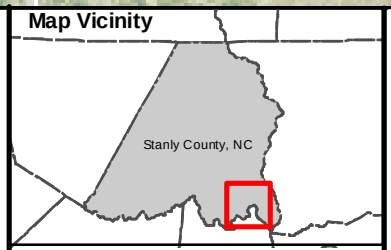
Annual Monitoring Plan - Year 1

Stanly County, NC

0 50 100 200 Feet

Baker

Map Vicinity



EEP Project No. : D06054-D
February 2010

LEGEND

- Conservation Easement
- Bare Bank
- Bare Floodplain
- Invasives
- Veg Plot Photos
- Veg Plots
- Asbuilt Streambank

Figure C5: Vegetation Problem Areas
UT1 (Station 10+00 to 24+00)

Big Cedar Creek Stream Restoration Project

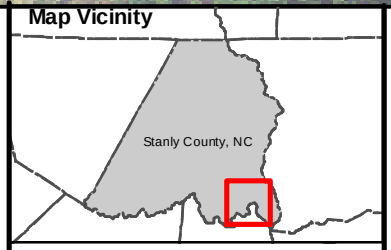
Annual Monitoring Plan - Year 1

Stanly County, NC

0 50 100 200 Feet

Ecosystem Enhancement Program

Map Vicinity



EEP Project No. : D06054-D
February 2010

LEGEND

- Conservation Easement
- Bare Bank
- Bare Floodplain
- Invasives
- Veg Plot Photos
- Veg Plots
- Asbuilt Streambank

Figure C6: Vegetation Problem Areas
UT1 (Station 23+00 to 36+00)

Big Cedar Creek Stream Restoration Project

Annual Monitoring Plan - Year 1

Stanly County, NC

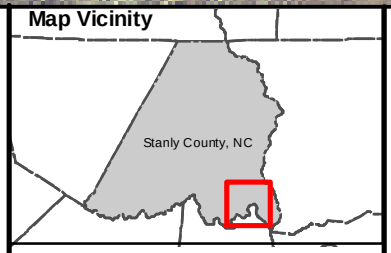
N

0 50 100 200 Feet

Baker

Ecosystem Enhancement Program

Map Vicinity



EEP Project No. : D06054-D
February 2010

LEGEND

- Conservation Easement
- Bare Bank
- Bare Floodplain
- Invasives
- Veg Plot Photos
- Veg Plots
- Asbuilt Streambank

Figure C7: Vegetation Problem Areas
UT1 (Stations 35+00 to 47+00)

Big Cedar Creek Stream Restoration Project

Annual Monitoring Plan - Year 1

Stanly County, NC

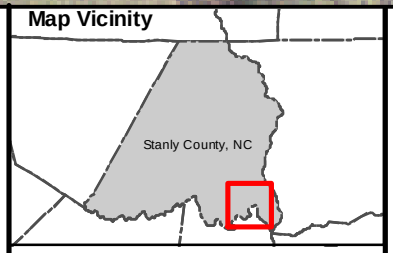
N

0 50 100 200 Feet

Baker

Ecosystem Enhancement PROGRAM

Map Vicinity



EEP Project No. : D06054-D
February 2010

LEGEND

- Asbuilt Streambank
- Conservation Easement
- Bare Bank
- Bare Floodplain
- Invasives
- Veg Plots
- Veg Plot Photos

Figure C8: Vegetation Problem Areas
UT1 (Stations 58+00 to 63+96) & BCC (Stations 68+00 to 76+00)

Big Cedar Creek Stream Restoration Project

Annual Monitoring Plan - Year 1

Stanly County, NC

0 50 100 200 Feet

Baker

Representative Vegetation Problem Area Photos

VPA 1 – Bare bank

VPA 2 – Invasive vegetation

VPA 3 – Bare bank on UT1

VPA 4 – Bare floodplain on UT1

VPA 5 – Bare spot from offsite storm pipe.

VPA 6 – Bare floodplain

VPA 7 – Bare floodplain

VPA 8 – Invasive vegetation

VPA 9 – Invasive vegetation on UT2

Appendix D

As-Built Plan Sheets

BIG CEDAR CREEK

SCO # D06054-D

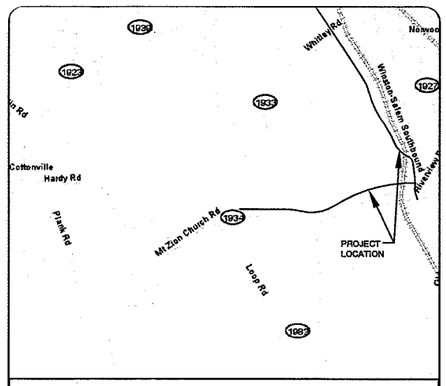
STATE	BAKER PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
NC	109261	1	67
SCO PROJECT NO. D06054-D			

NC ECOSYSTEM ENHANCEMENT PROGRAM

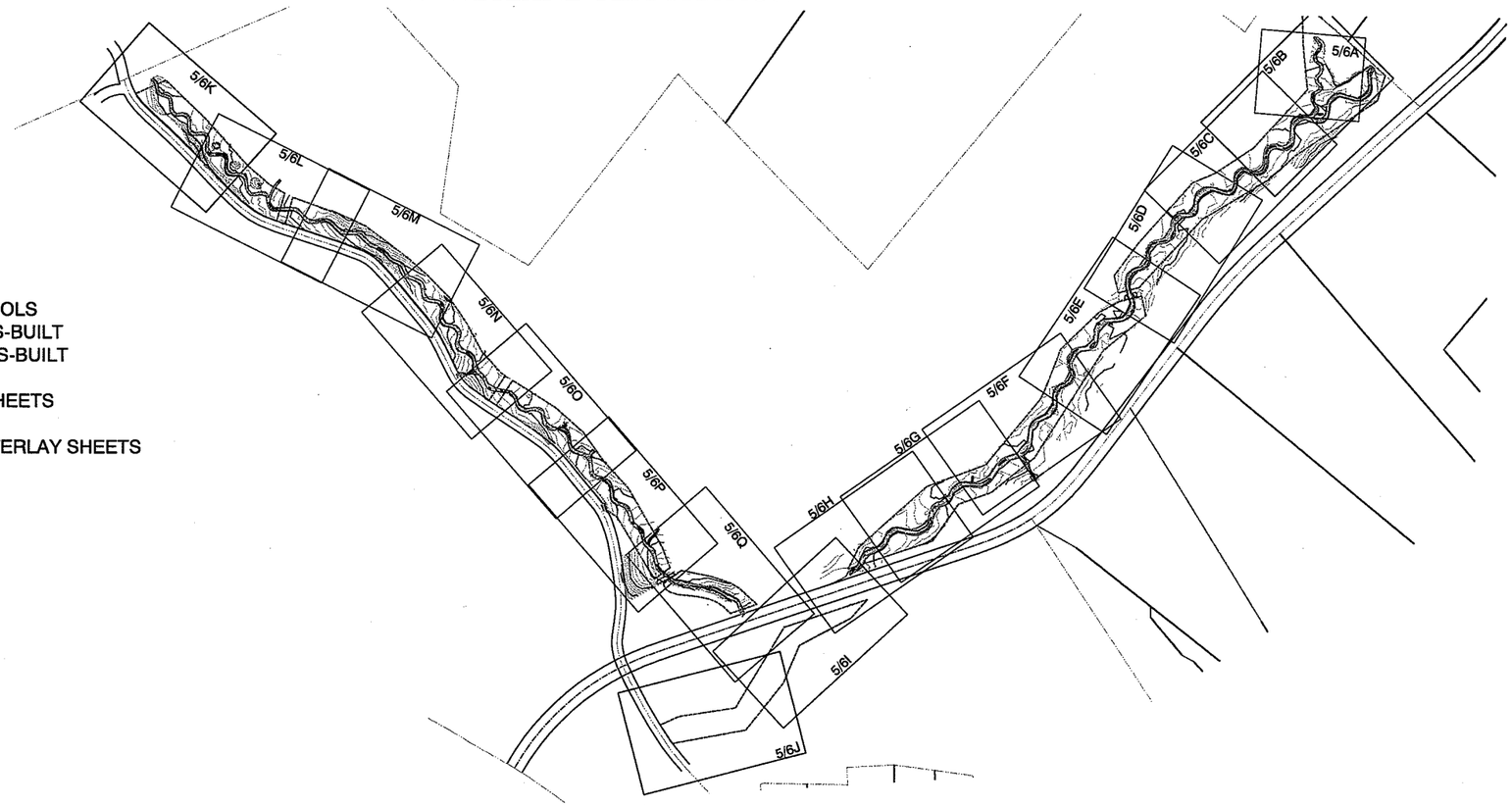
STANLY COUNTY

LOCATION:
SOUTH APPROX. 12 MILES FROM THE INTERSECTION OF HWY 24/27 & HWY 52 THEN APPROX. 1 MILE FROM INTERSECTION OF HWY 52 & MT. ZION CHURCH RD.

TYPE OF WORK:
STREAM AND WETLAND RESTORATION



VICINITY MAP - NTS



INDEX OF SHEETS

GRAPHIC SCALES

20 0 20 40
PLANS

20 0 20 40
PROFILE (HORIZONTAL)

2 0 2 4
PROFILE (VERTICAL)

STREAM COORDINATE SUMMARY

STREAM NAME	STATION	LATITUDE & LONGITUDE
BIG CEDAR CREEK	10+00	LAT: 35° 12' 31.80" LONG: 80° 07' 43.62"
UNNAMED TRIBUTARY 1	10+00	LAT: 35° 11' 29.40" LONG: 80° 05' 19.14"
UNNAMED TRIBUTARY 2	10+00	LAT: 35° 12' 29.49" LONG: 80° 07' 47.34"
UNNAMED TRIBUTARY 3	10+00	LAT: 35° 12' 04.35" LONG: 80° 07' 27.84"
UNNAMED TRIBUTARY 1A	10+00	LAT: 35° 11' 44.02" LONG: 80° 07' 36.06"
UNNAMED TRIBUTARY 1B	10+00	LAT: 35° 11' 41.86" LONG: 80° 07' 45.39"
UNNAMED TRIBUTARY 1C	10+00	LAT: 35° 11' 33.41" LONG: 80° 08' 08.97"

PREPARED FOR THE OFFICE OF:

Ecosystem Enhancement PROGRAM

NCDENR-ECOSYSTEM ENHANCEMENT PROGRAM
2728 CAPITAL BLVD, SUITE 1H 103
RALEIGH, NC 27604

NCEEP CONTACT: GUY PEARCE
REVIEW COORDINATOR

NCEEP CONTACT: TIM BAUMGARTNER
PROJECT MANAGER

PREPARED IN THE OFFICE OF:

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KEVIN TWEEDY, P.E.
PROJECT ENGINEER

CHRISTINE D. MILLER
PROJECT DESIGNER

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN L. TWEEDY

8-11-09

SIGNATURE *P.E.*

BAKER PROJECT REFERENCE NO.	SHEET NO.
109261	2

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SYMBOLOGY

- E — RECORDED CONSERVATION EASEMENT
- 725 — EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- X — EXISTING FENCE
- CENTERLINE RAILROAD
- ROW
- PARCEL BOUNDARY
- EXISTING ROAD/PAVEMENT
- 10+00 — EXISTING STREAM ALIGNMENT
- 10+00 — PROPOSED STREAM ALIGNMENT
- EXISTING EDGE OF WOODS
- EXISTING TREE
- PERMANENT STREAM CROSSING
- FLOW DIRECTION
- GEOLIFT
- BANK STABILIZATION
- TRANSPLANT
- ROCK CROSS VANE
- LOG SILL
- ROOT WAD
- LOG J-HOOK VANE
- BRUSH MATTRESS
- LOG VANE
- LOG STEP-POOL
- CONSTRUCTED RIFFLE (NATIVE MATERIAL)
- FLOODPLAIN POOL
- COVER LOG

BIG CEDAR CREEK

SYMBOLOGY

BAKER PROJECT REFERENCE NO.	SHEET NO.
109261	3A

PROJECT ENGINEER

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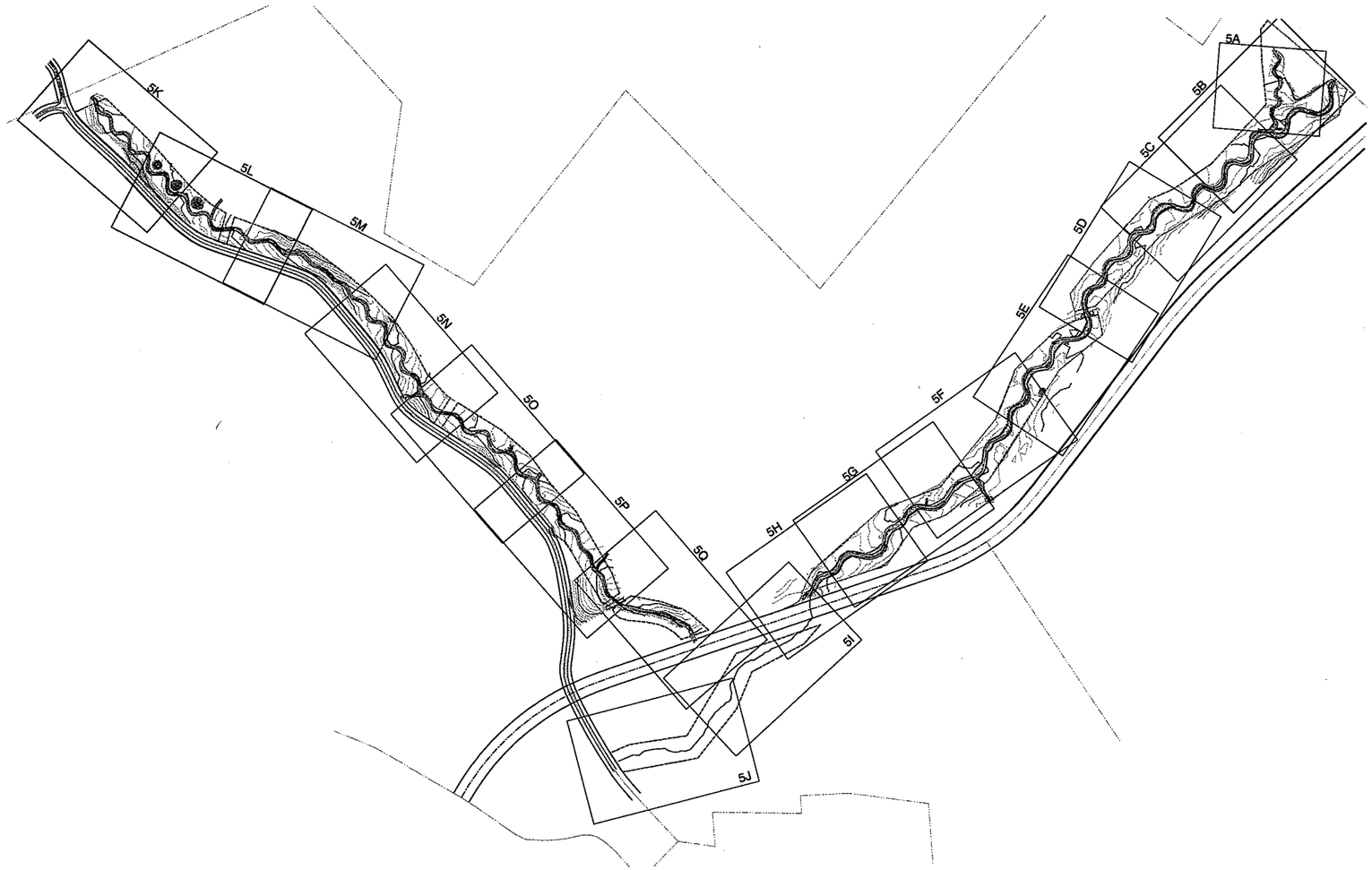
AS-BUILT KEY SHEET



BIG CEDAR CREEK

AS-BUILT KEY SHEET

BAKER PROJECT REFERENCE NO.	SHEET NO.
109261	5A

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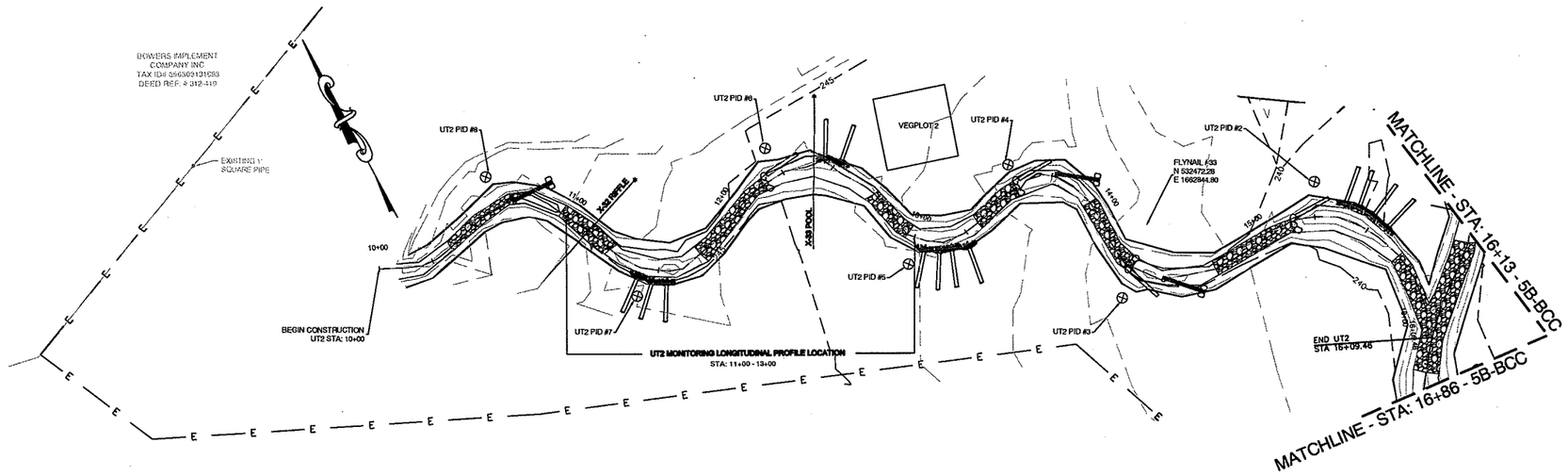

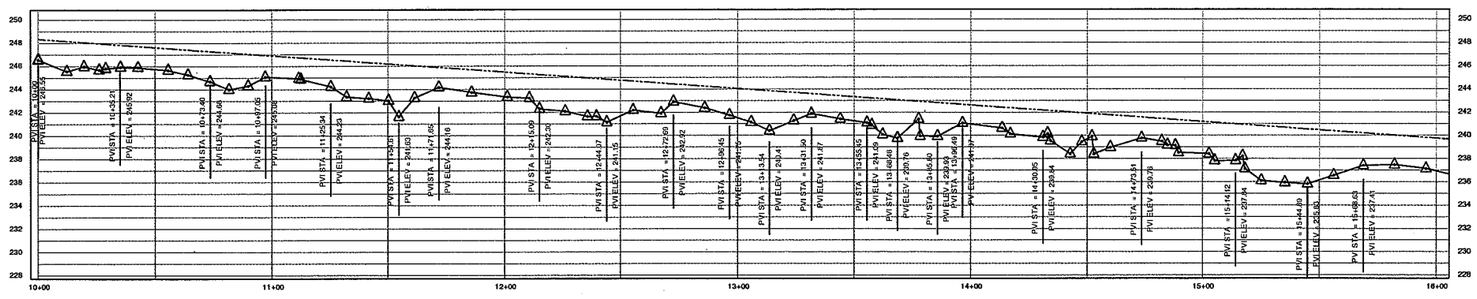

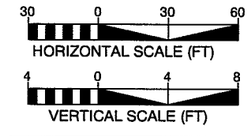

BIG CEDAR CREEK

UT2 AS-BUILT

BAKER PROJECT REFERENCE NO.	SHEET NO.
109261	5B

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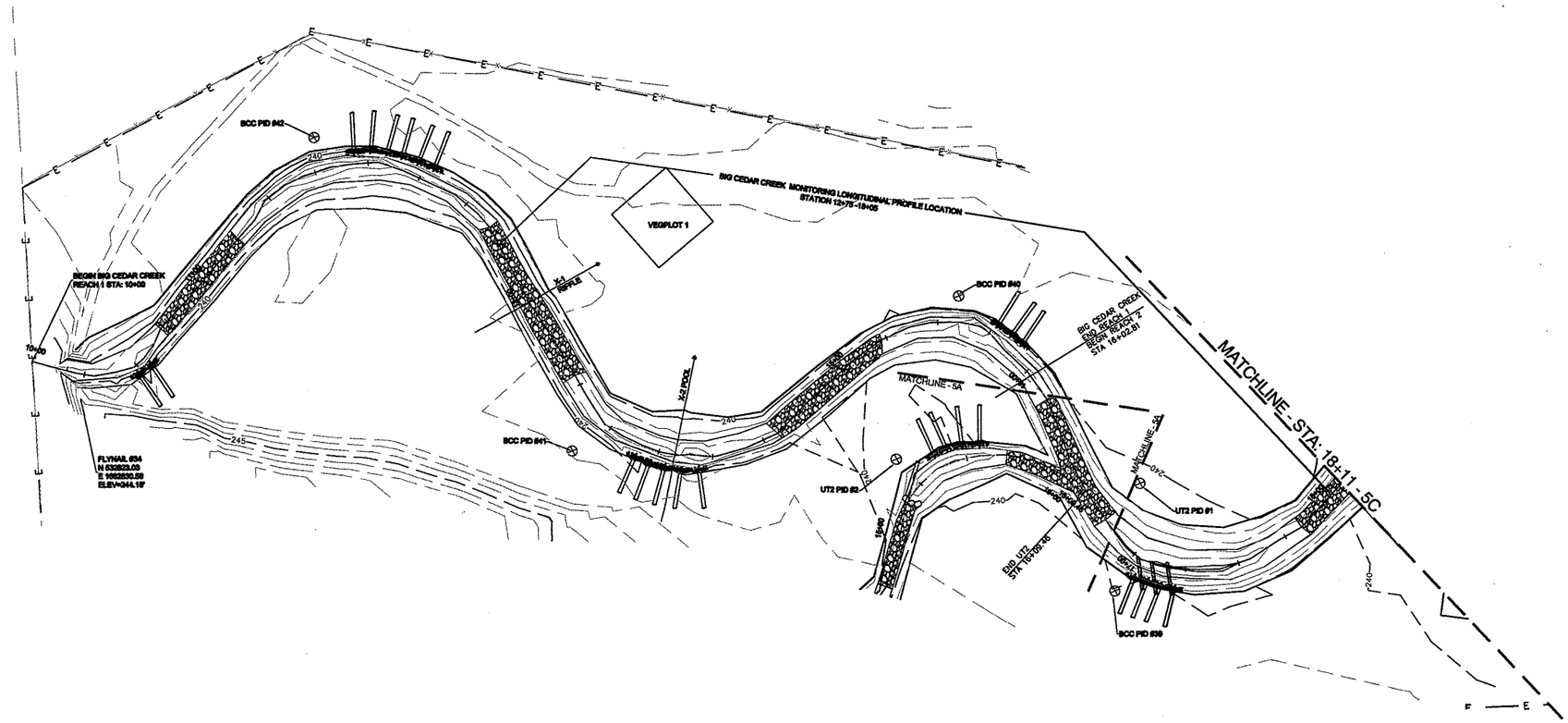

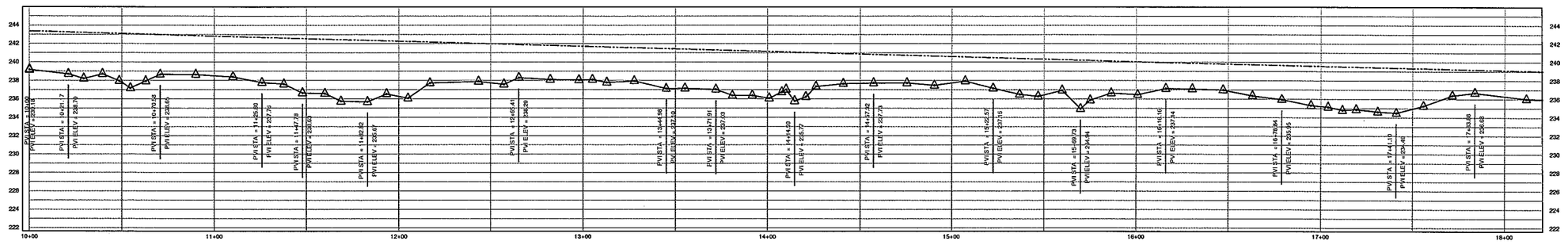

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VERTICAL SCALE (FT)

BIG CEDAR CREEK

BIG CEDAR CREEK
AS-BUILT

BAKER PROJECT REFERENCE NO.	SHEET NO.
109261	5C

PROJECT ENGINEER

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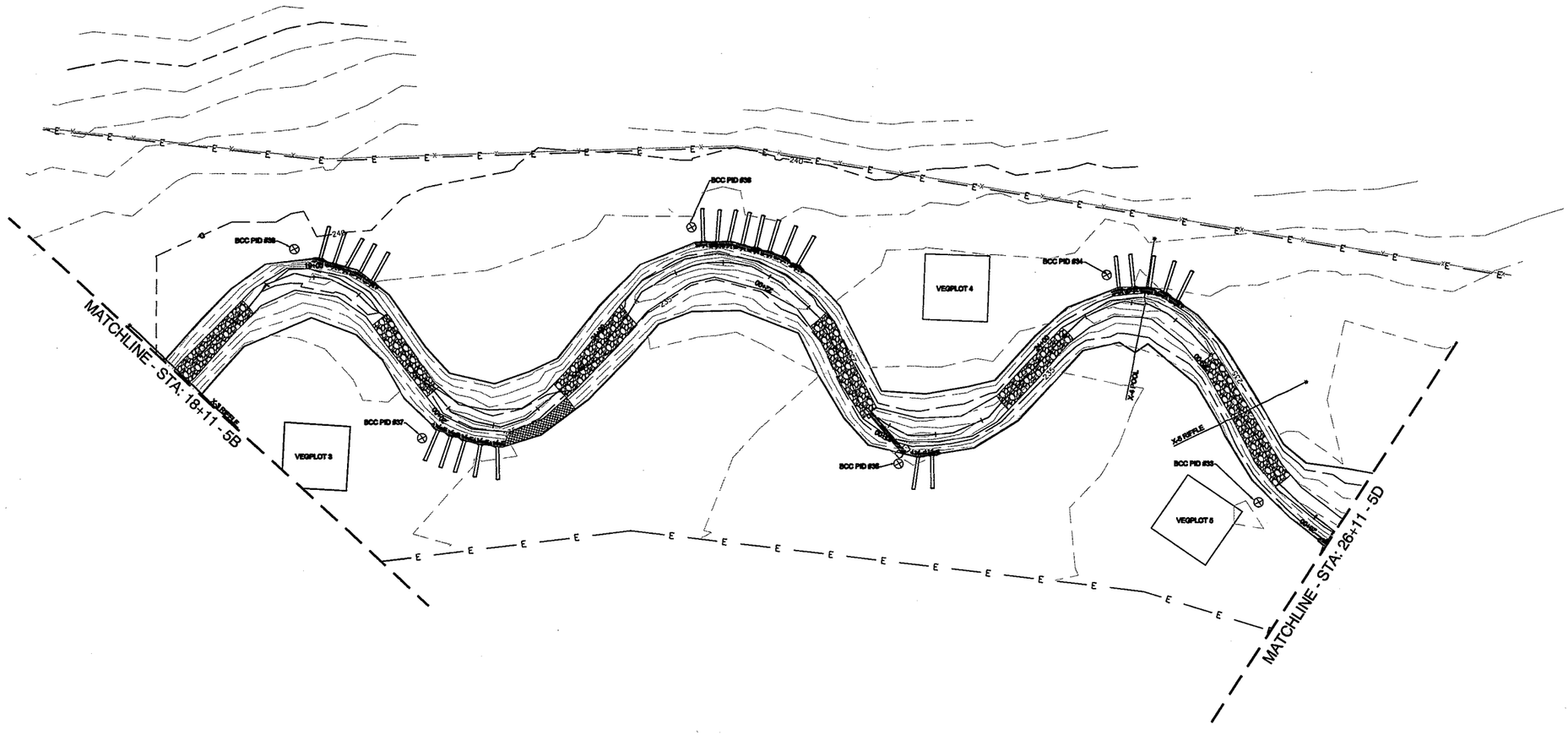

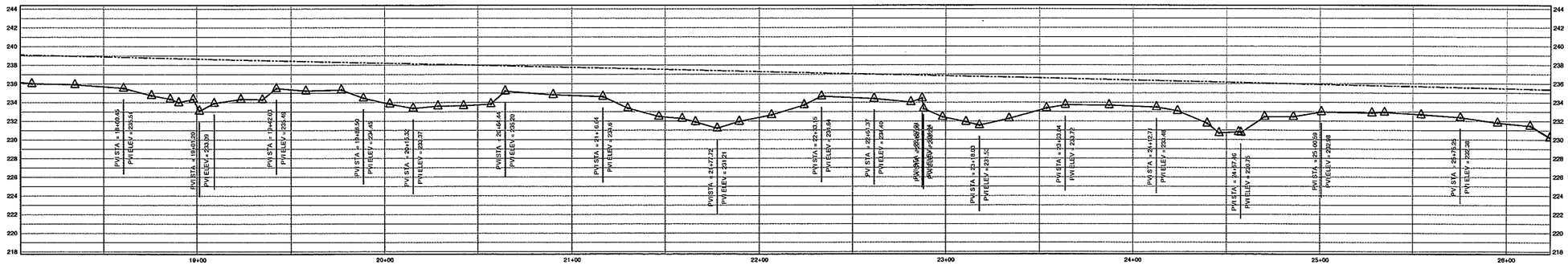

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BIG CEDAR CREEK

BIG CEDAR CREEK
AS-BUILT

BAKER PROJECT REFERENCE NO.	SHEET NO.
109261	5D

PROJECT ENGINEER

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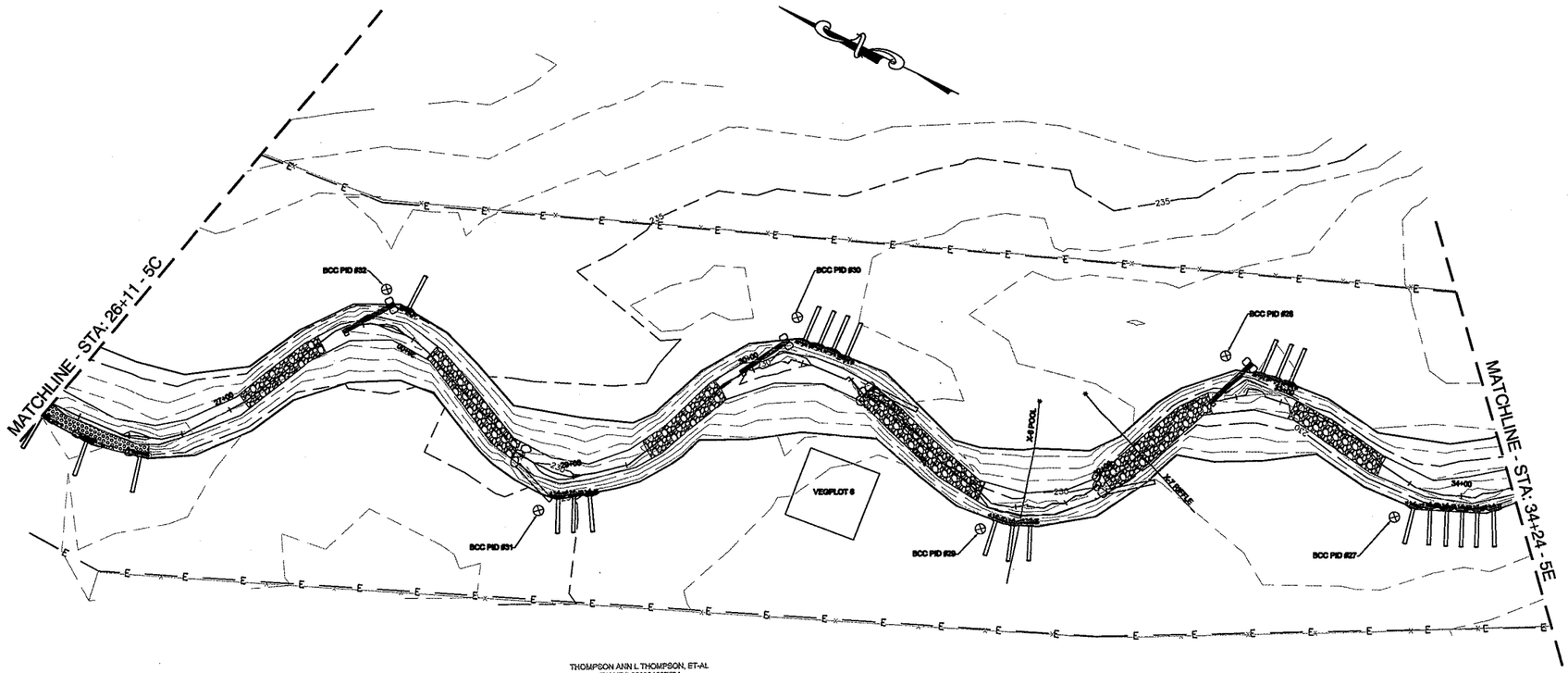

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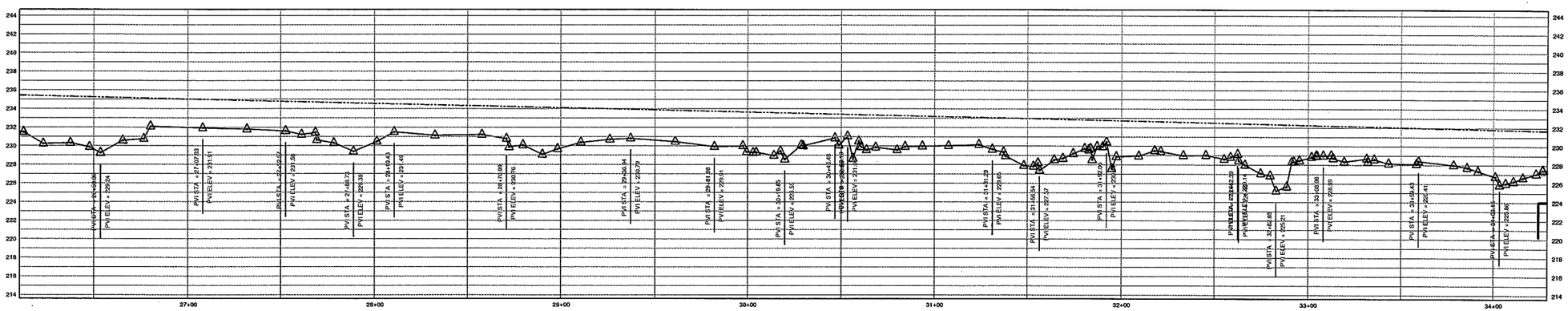

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BIG CEDAR CREEK

BIG CEDAR CREEK
AS-BUILT

BAKER PROJECT REFERENCE NO.	SHEET NO.
109261	5E

PROJECT ENGINEER

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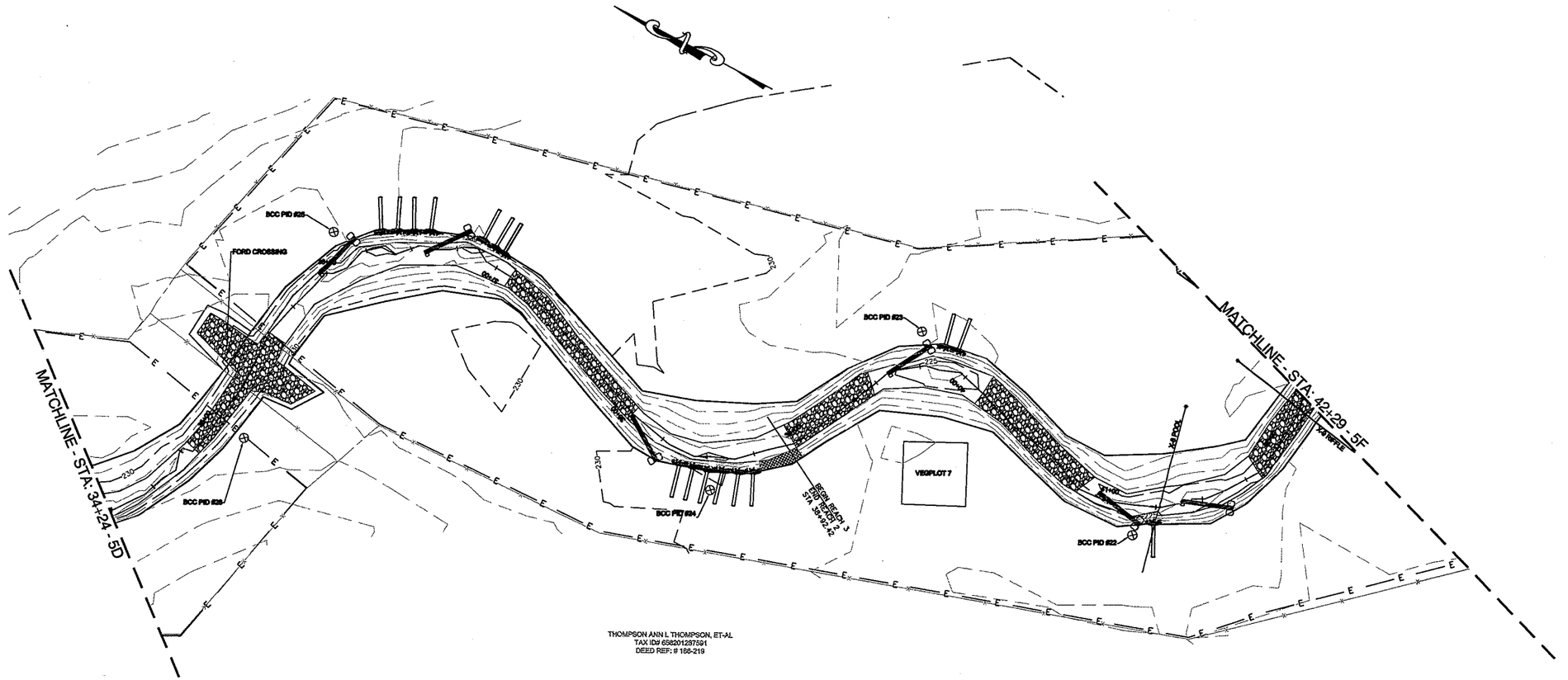

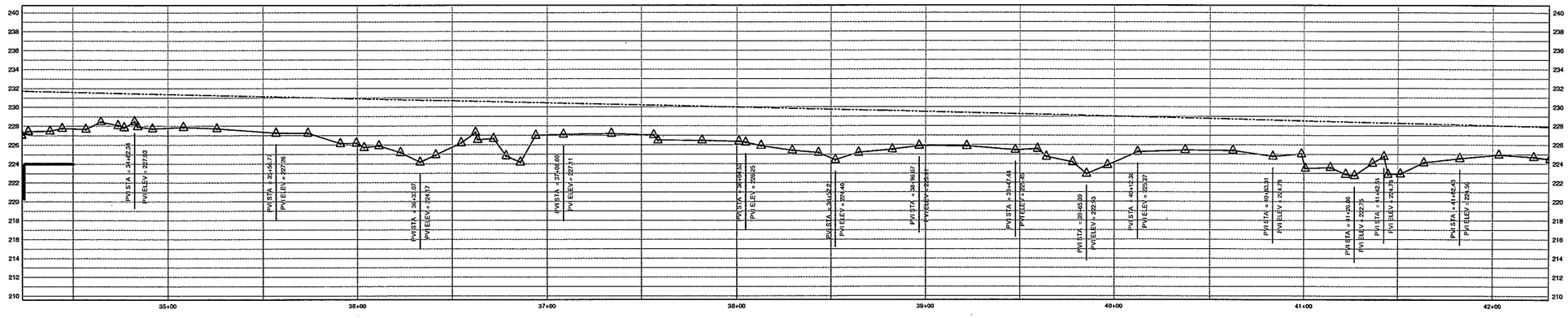

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BIG CEDAR CREEK

BIG CEDAR CREEK
AS-BUILT

BAKER PROJECT REFERENCE NO.	SHEET NO.
109261	5F

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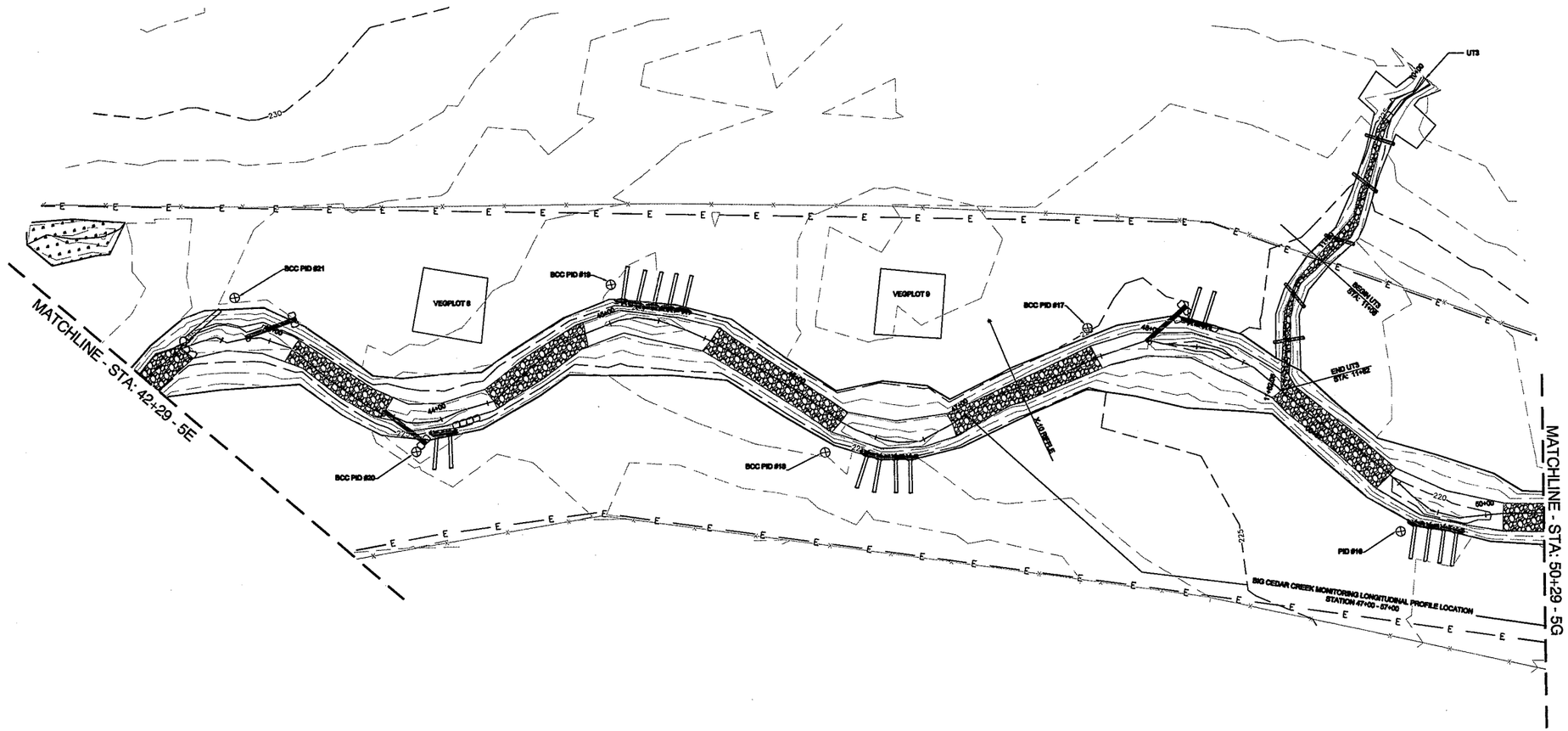

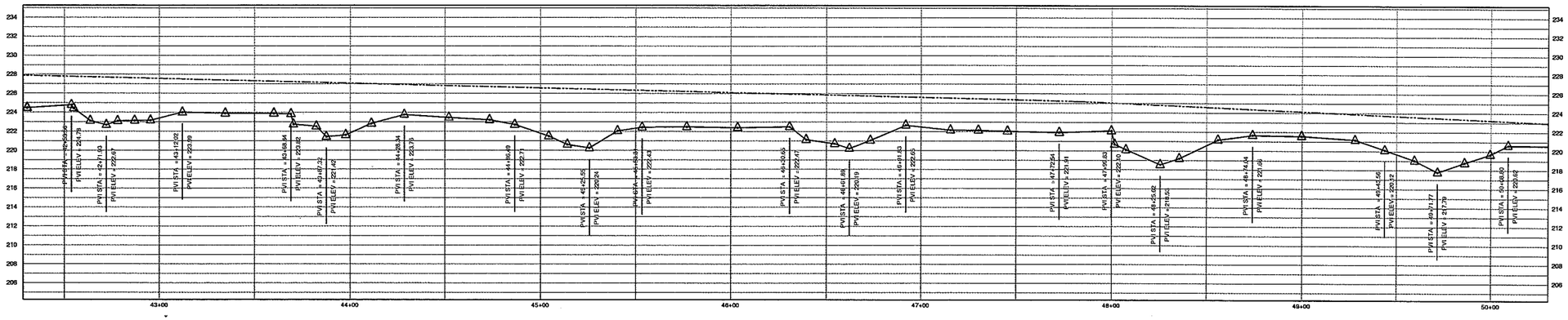

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BIG CEDAR CREEK

BIG CEDAR CREEK
AS-BUILT

BAKER PROJECT REFERENCE NO.	SHEET NO.
109261	5G

PROJECT ENGINEER

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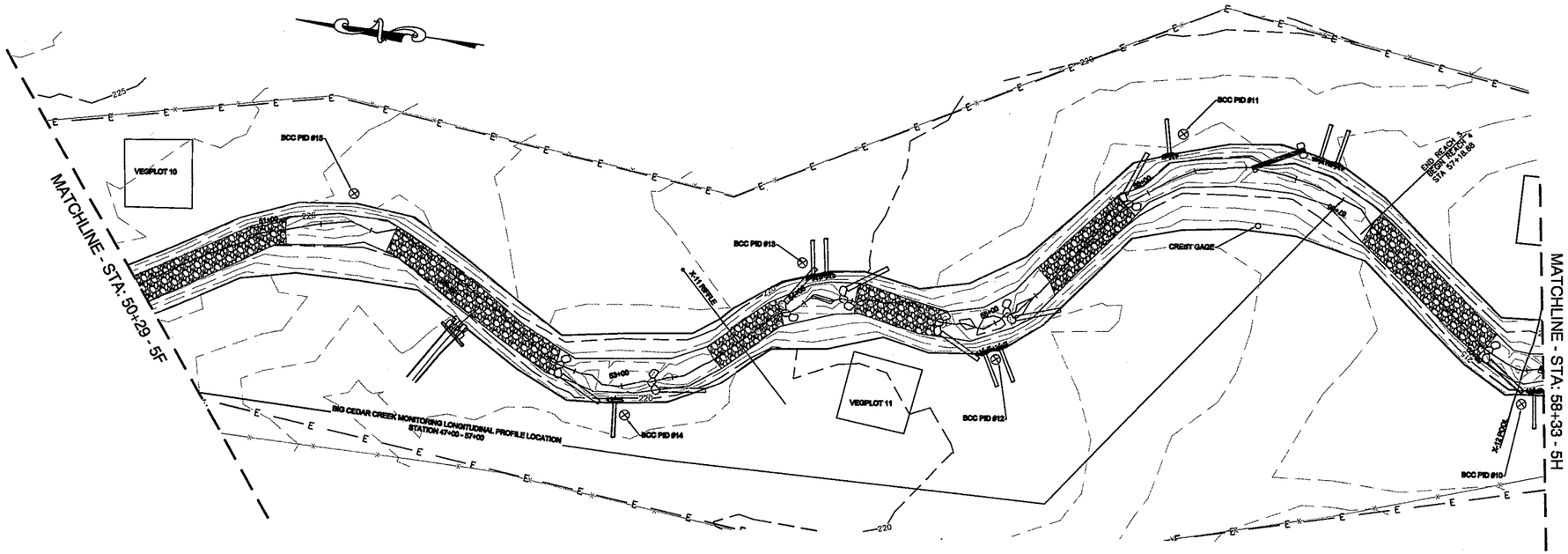

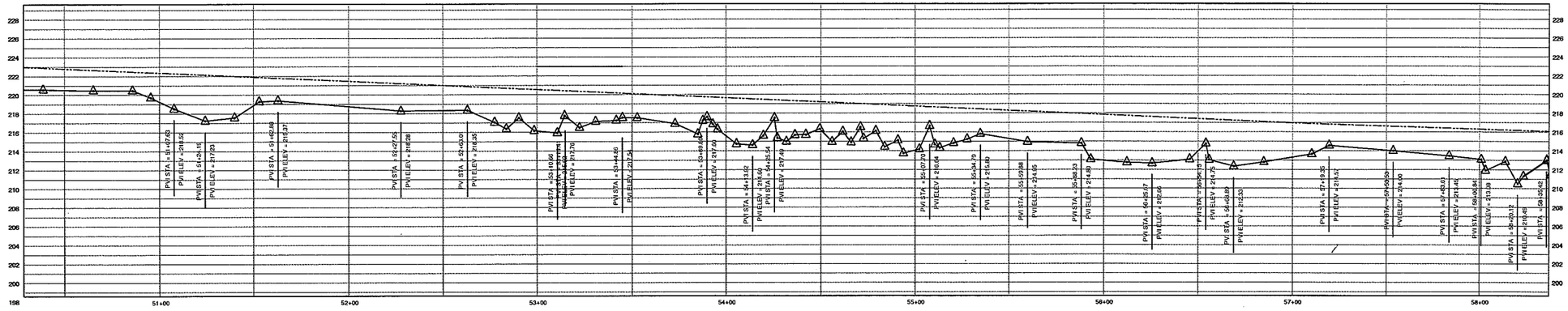

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BIG CEDAR CREEK

BIG CEDAR CREEK
AS-BUILT

BAKER PROJECT REFERENCE NO.	SHEET NO.
109261	5H

PROJECT ENGINEER

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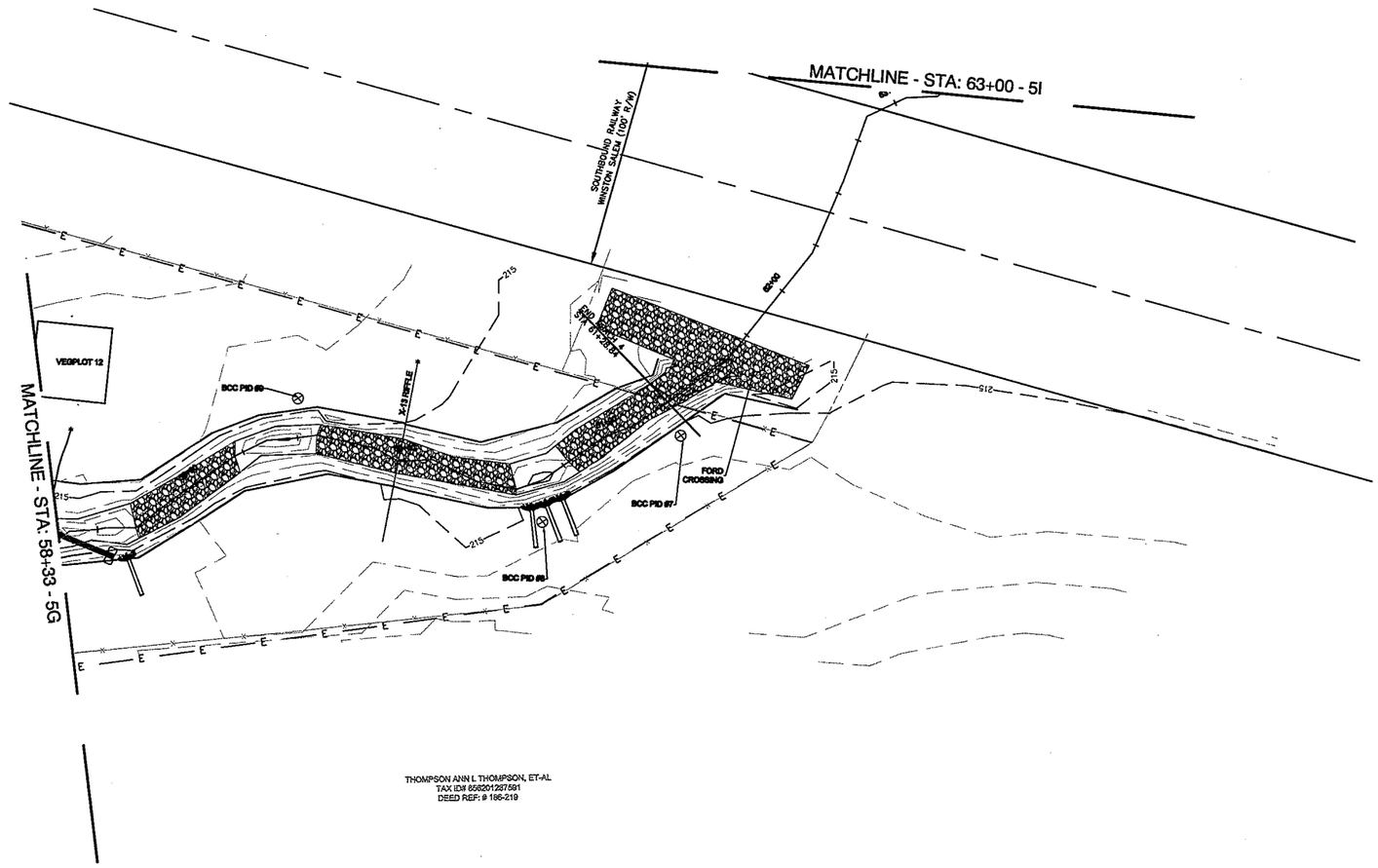

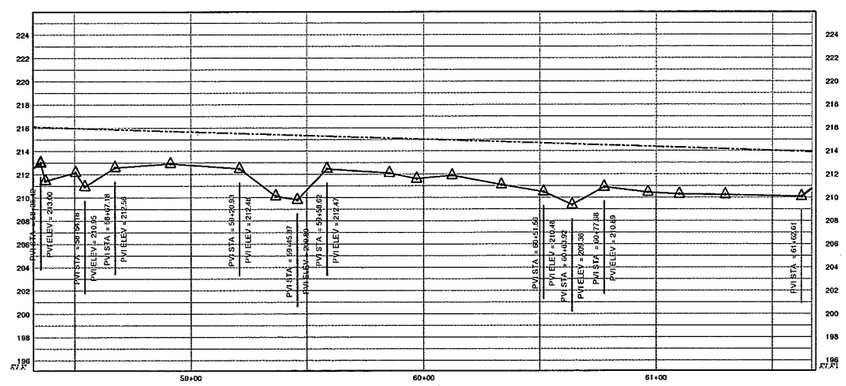

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BIG CEDAR CREEK

BIG CEDAR CREEK
AS-BUILT

BAKER PROJECT REFERENCE NO.	SHEET NO.
109261	51

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER

5-11-09

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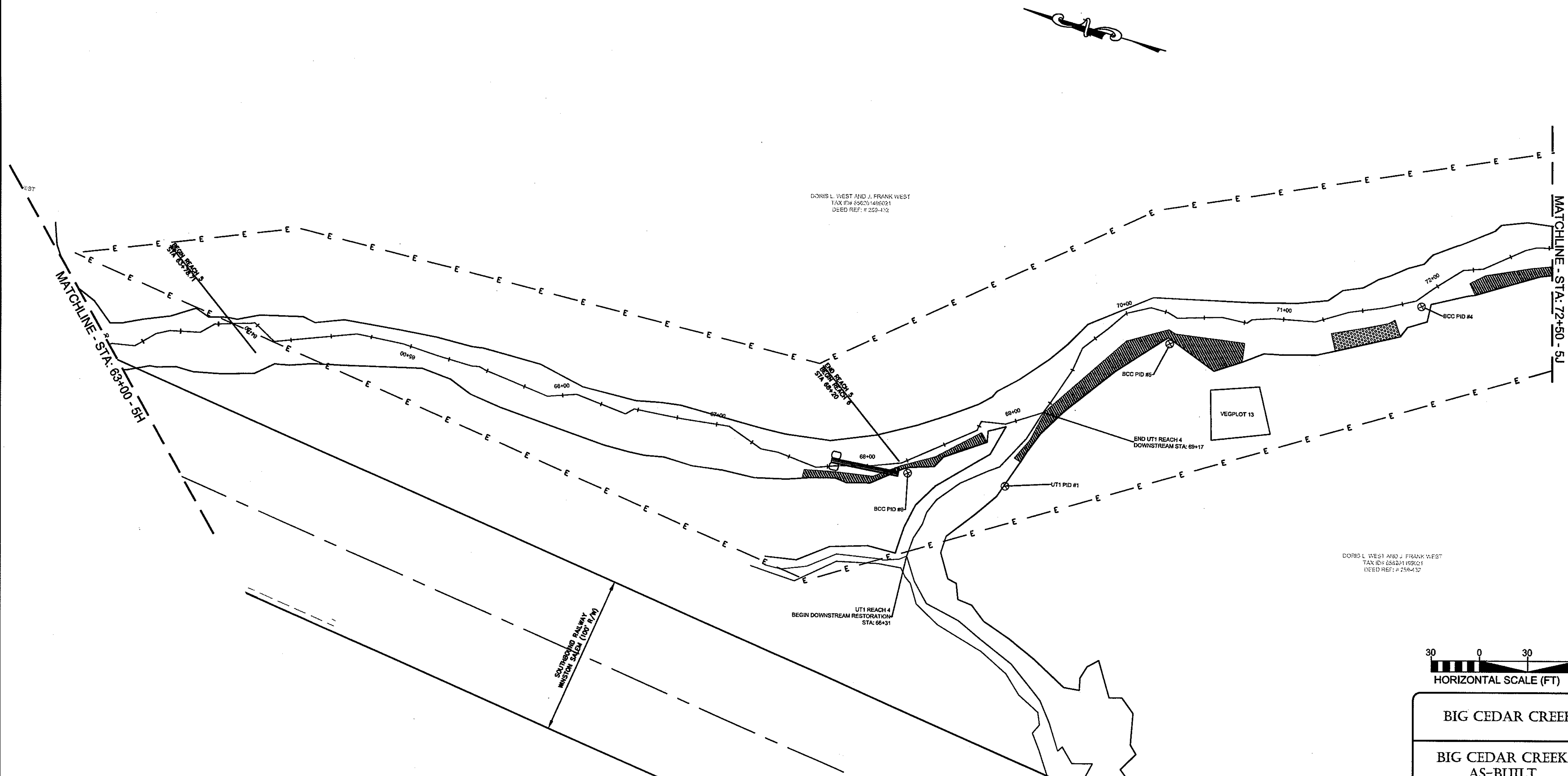

BIG CEDAR CREEK

BIG CEDAR CREEK
AS-BUILT

BAKER PROJECT REFERENCE NO.	SHEET NO.
109261	5J

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN L. TWEEDY

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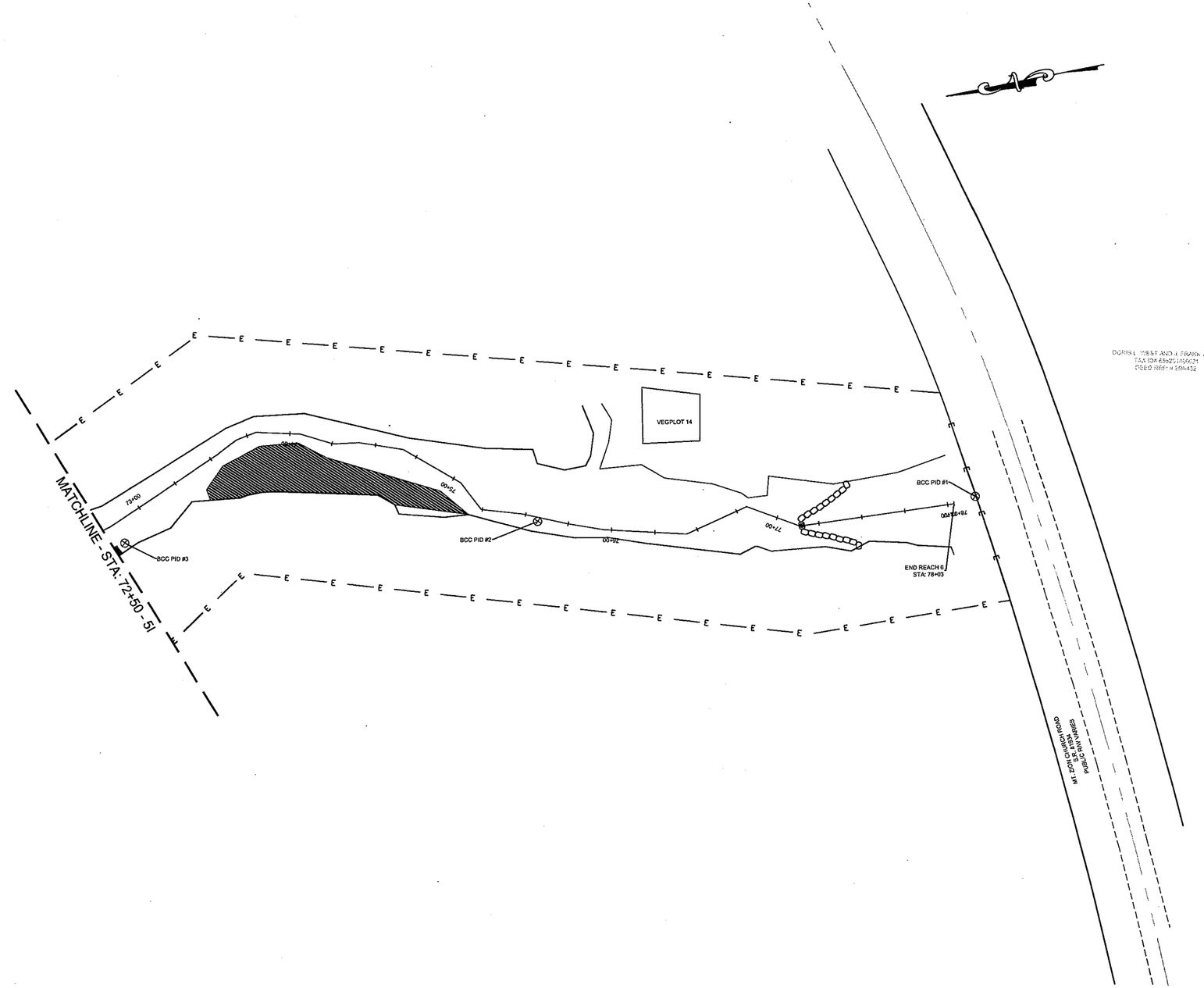

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HORIZONTAL SCALE (FT)

BIG CEDAR CREEK

BIG CEDAR CREEK
AS-BUILT

BAKER PROJECT REFERENCE NO.	SHEET NO.
109261	5K

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN L. TWEEDY

8-18-09

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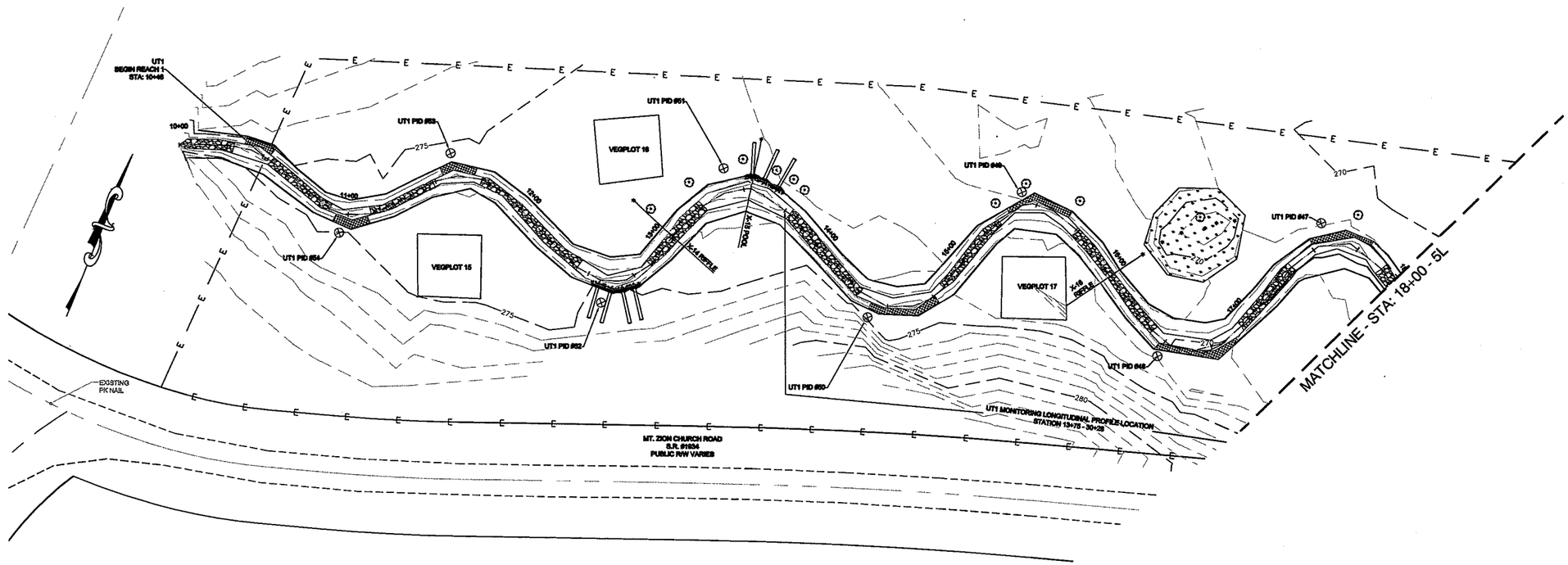

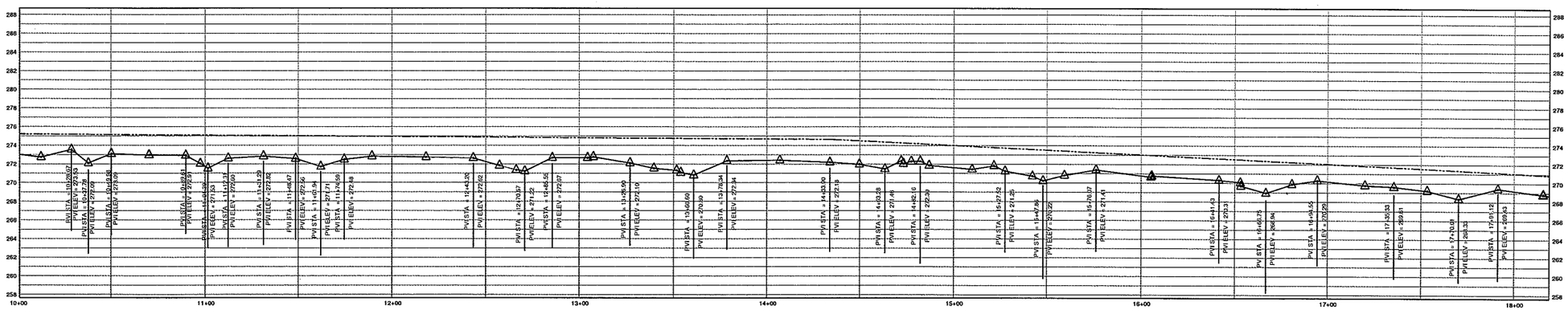

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VERTICAL SCALE (FT)

BIG CEDAR CREEK

UT1 AS-BUILT

BAKER PROJECT REFERENCE NO.	SHEET NO.
109261	5L

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN L. MARTIN

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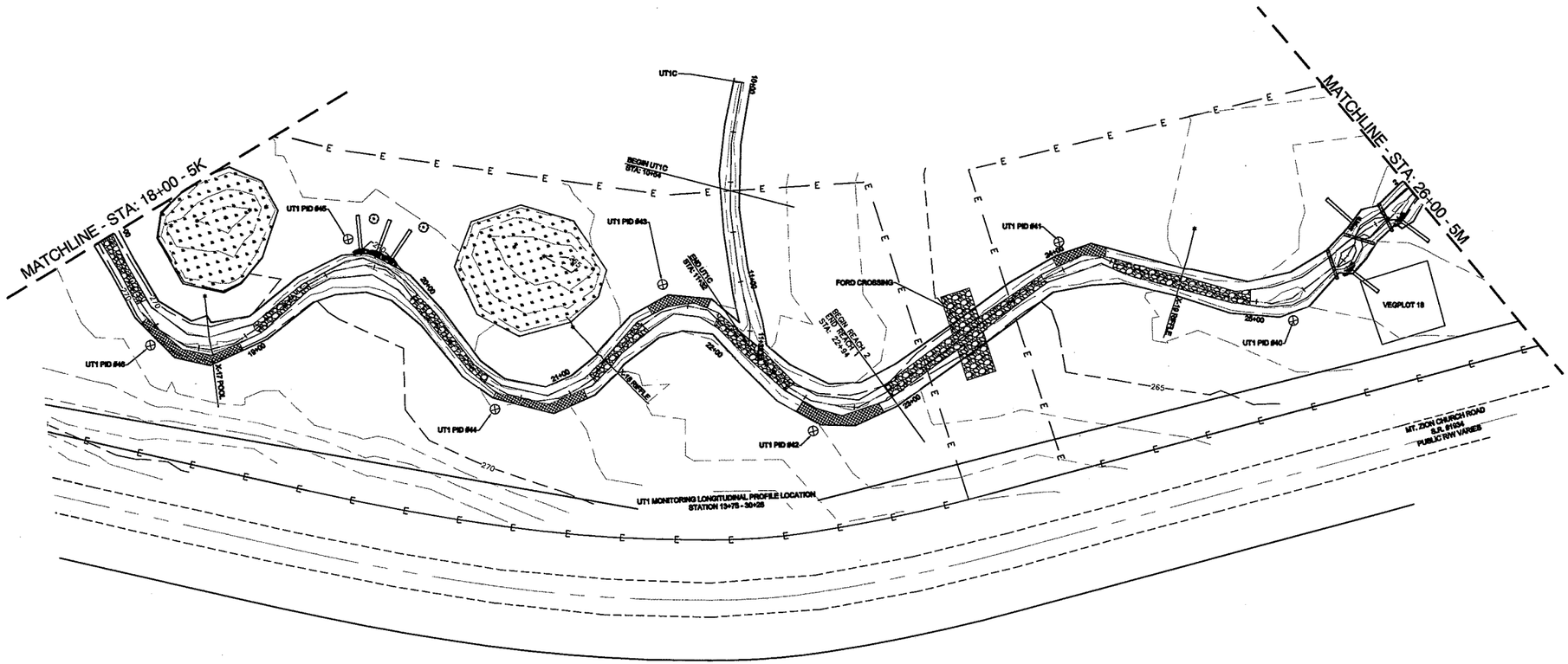

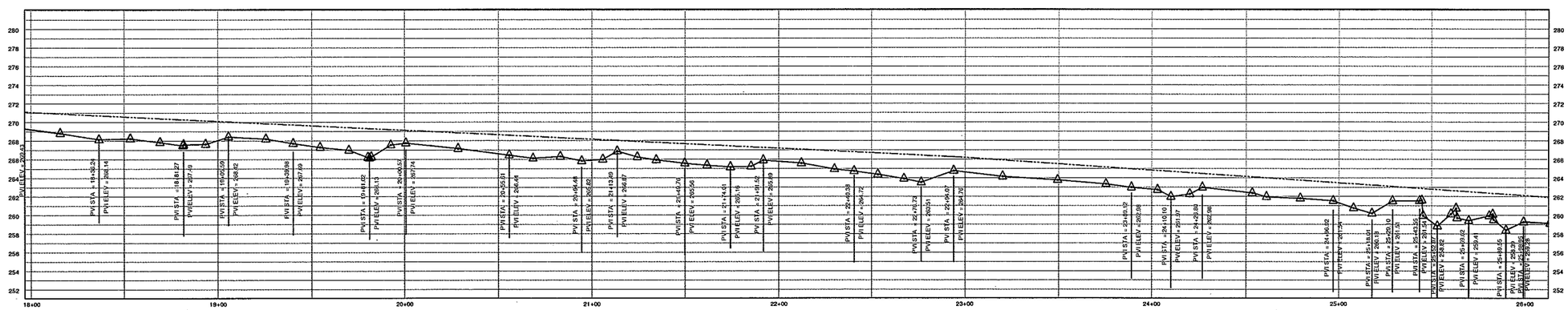

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HORIZONTAL SCALE (FT)

4 0 4 8
VERTICAL SCALE (FT)

BIG CEDAR CREEK

UT1 AS-BUILT

BAKER PROJECT REFERENCE NO.	SHEET NO.
109261	5M

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN I. HARRIS

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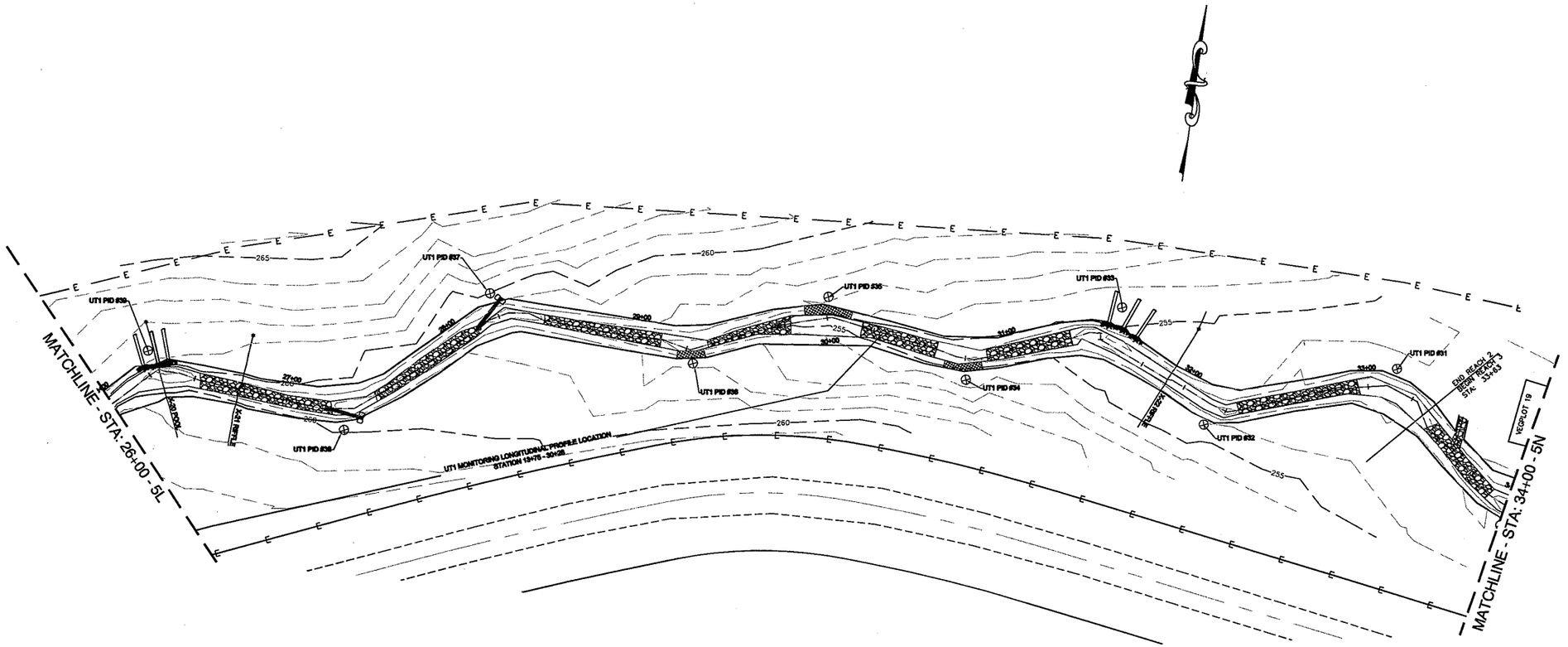

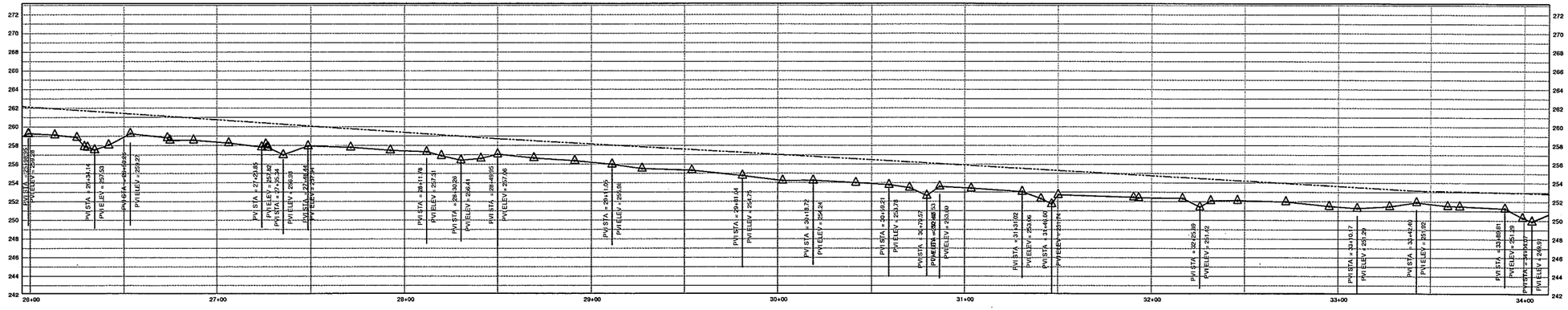

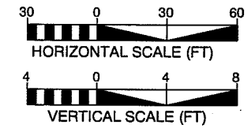

BIG CEDAR CREEK

UT1 AS-BUILT

BAKER PROJECT REFERENCE NO.	SHEET NO.
109261	5N

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN L. TWEDT

8-11-09

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Michael Baker Engineering, Inc.
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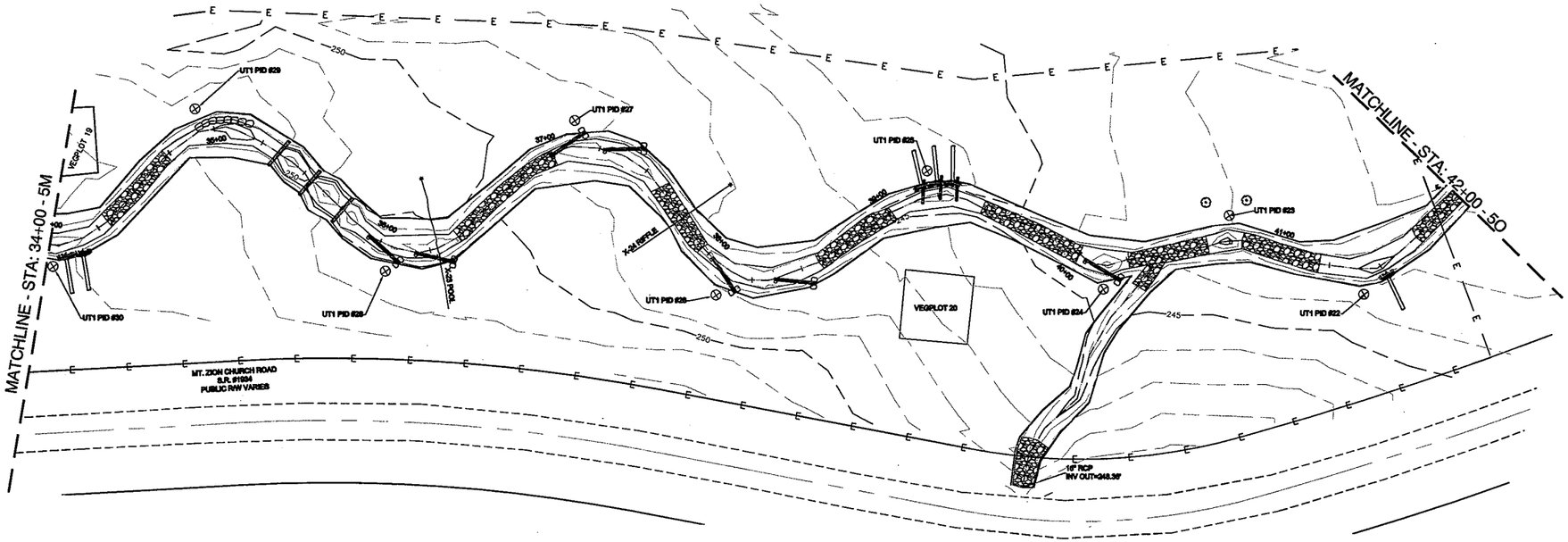

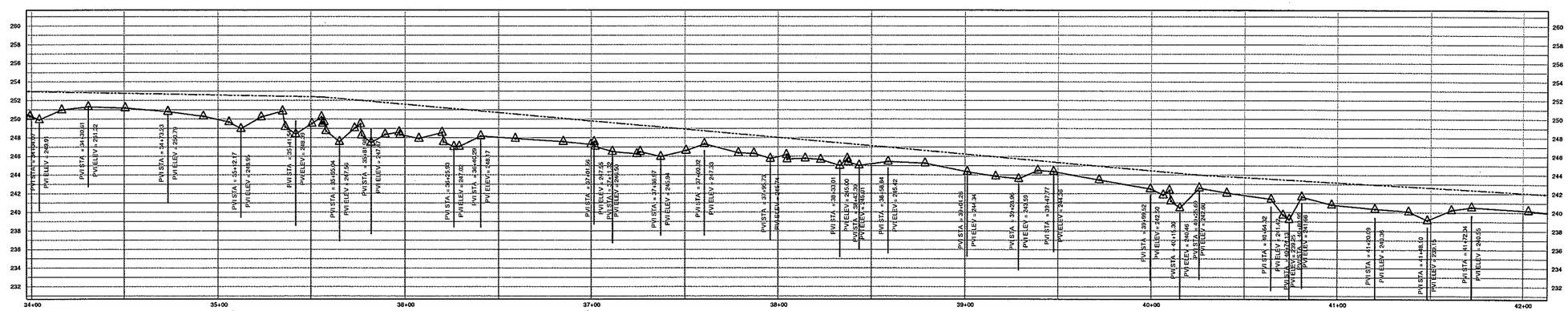

30 0 30 60
HORIZONTAL SCALE (FT)

4 0 4 8
VERTICAL SCALE (FT)

BIG CEDAR CREEK

UT1 AS-BUILT

BAKER PROJECT REFERENCE NO.	SHEET NO.
109261	50

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN L. TWEERY

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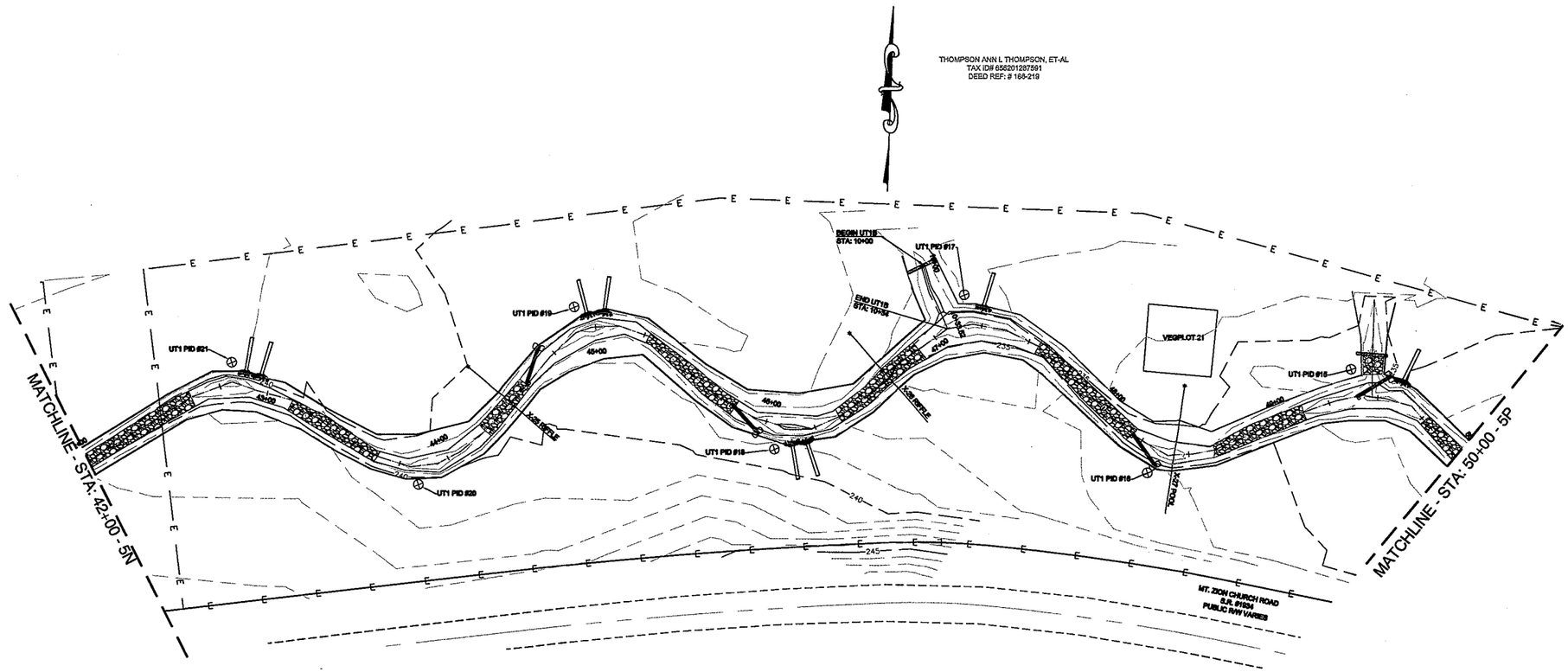

BIG CEDAR CREEK

UT1 AS-BUILT

BAKER PROJECT REFERENCE NO.	SHEET NO.
109261	5P

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN L. TWEEDY

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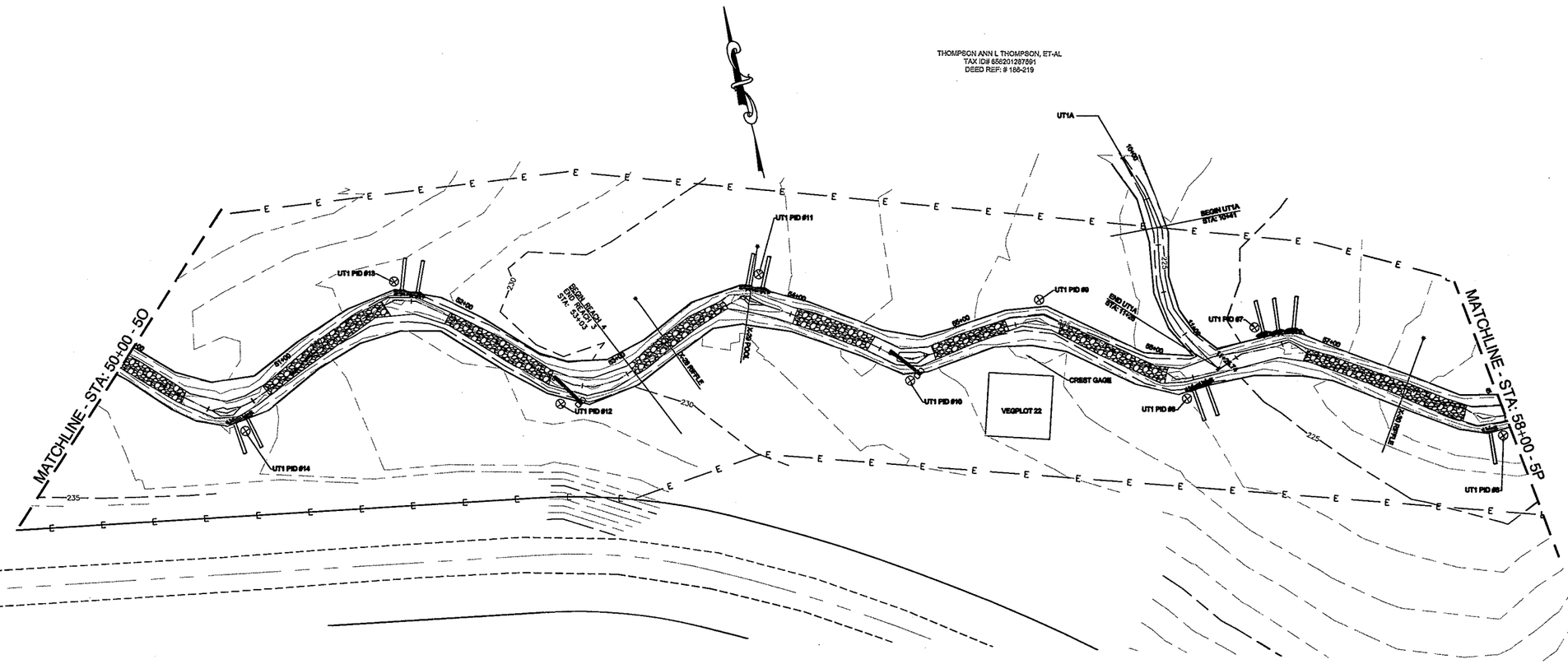

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HORIZONTAL SCALE (FT)

4 0 4 8
VERTICAL SCALE (FT)

BIG CEDAR CREEK

UT1 AS-BUILT

BAKER PROJECT REFERENCE NO.	SHEET NO.
109261	5Q

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN L. TWEDT

8-11-09

Baker
Michael Baker Engineering, Inc.
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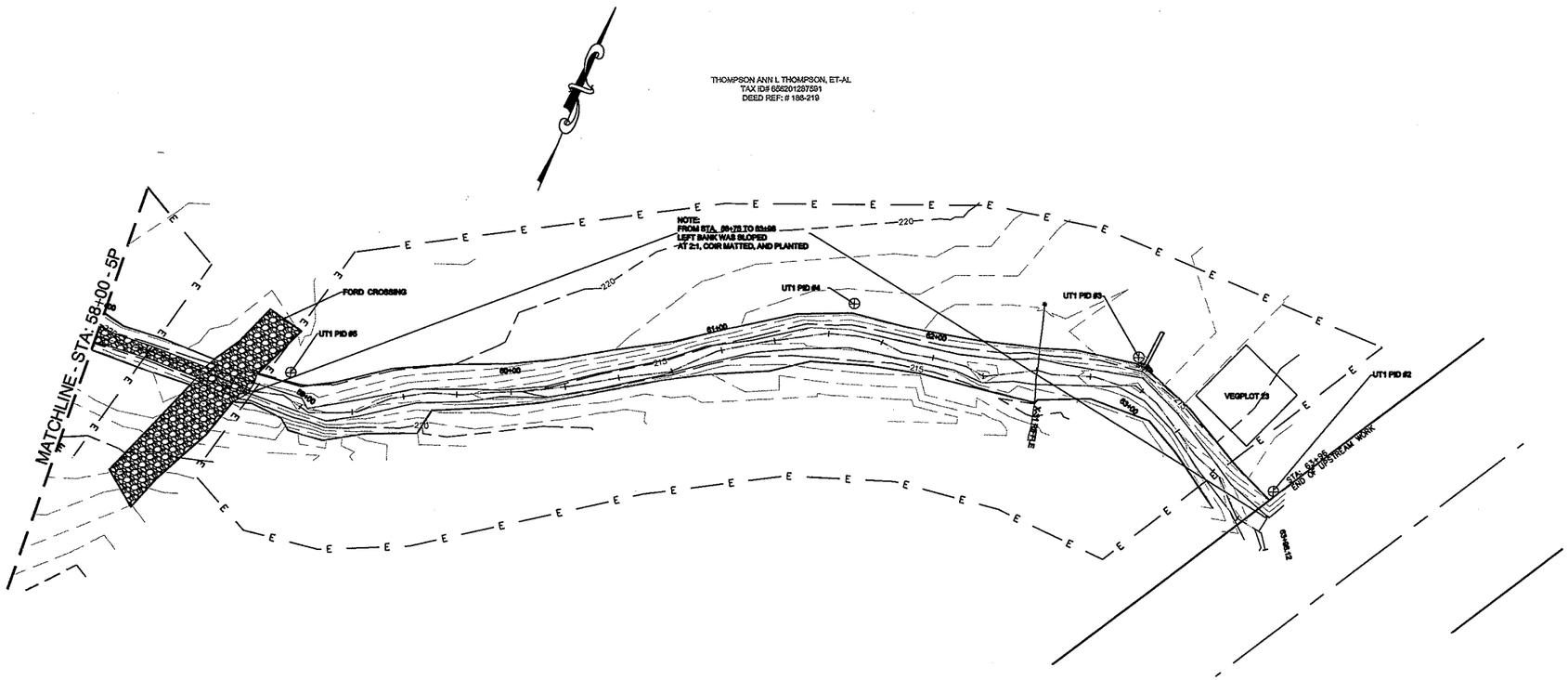

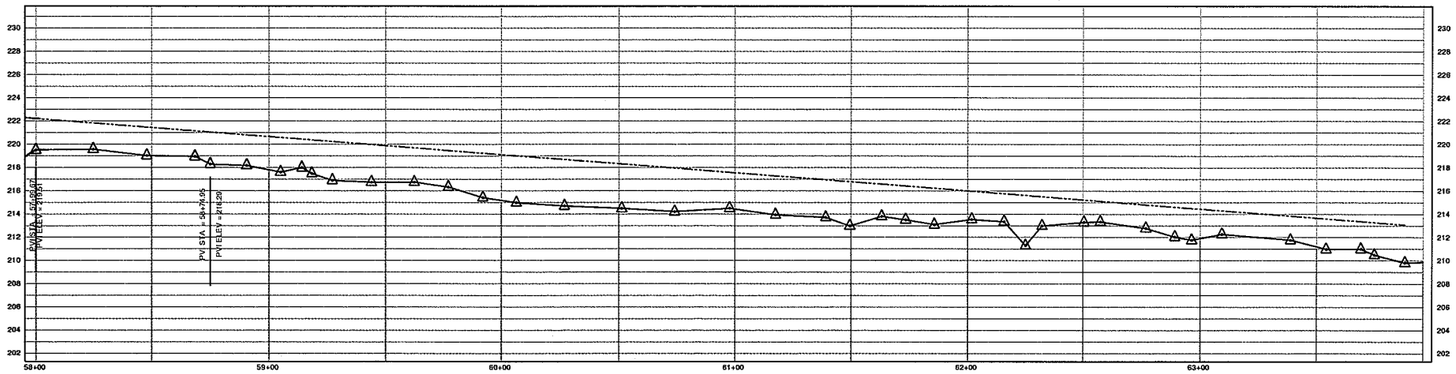

30 0 30 60
HORIZONTAL SCALE (FT)

4 0 4 8
VERTICAL SCALE (FT)

BIG CEDAR CREEK

UT1 AS-BUILT

APPENDIX E:
PHOTO ID LOG

Big Cedar Creek Photos

BCC P1D 1– Cross Vane, BCC Reach 6 End

BCC PID 2 – Re-graded Riffle, BCC Reach 6

BCC PID 3 –Existing Riffle, BCC Reach 6

BCC PID 4 – Re-graded Riffle, BCC Reach 6

BCC PID 5 – Re-graded Riffle, BCC Reach 6

BCC PID 6 – Log Vane in distance, BCC Reach 6 Start

BCC PID 7 – Constructed Riffle, BCC Reach 4 End

BCC PID 8 – Constructed Riffle, BCC Reach 4

BCC PID 9 – Constructed Riffle, BCC Reach 4

BCC PID 10 – Constructed Riffle, BCC Reach 4 Start

BCC PID 11 – Log J-Hook & Constructed Riffle , BCC Reach 3 End

BCC PID 12 – Log J-Hook Step Pool, BCC Reach 3

BCC PID 13 – Log J-Hook &
Constructed Riffle, BCC Reach 3

BCC PID 14 – Constructed Riffle, BCC Reach 3

BCC PID 15 – Constructed Riffle, BCC Reach 3

BCC PID 16 – Constructed Riffle, BCC Reach 3

BCC PID 17 – Constructed Riffle, UT1 Reach 3

BCC PID 18 – Constructed Riffle, BCC Reach 3

BCC PID 19 – Constructed Riffle, BCC Reach 3

BCC PID 20 – Constructed Riffle, BCC Reach 3

BCC PID 21 – Constructed Riffle, BCC Reach 3

BCC PID 22 – Constructed Riffle, BCC Reach 3

BCC PID 23 – Constructed Riffle, BCC Reach 3 Start

BCC PID 24 – Constructed Riffle, BCC Reach 2 End

BCC PID 25 – Riffle Crossing, BCC Reach 2

BCC PID 26 – Constructed Riffle, BCC Reach 2

BCC PID 27 – Constructed Riffle, BCC Reach 2

BCC PID 28 – Log J-Hook & Constructed Riffle, BCC Reach 2

BCC PID 29 – Log J-Hook & Constructed Riffle, BCC Reach 2

BCC PID 30 – Constructed Riffle, BCC Reach 2

BCC PID 31 – Constructed Riffle, BCC Reach 2

BCC PID 32 – Constructed Riffle, BCC Reach 2

BCC PID 33 – Constructed Riffle, BCC Reach 2

BCC PID 34 – Constructed Riffle, BCC Reach 2

BCC PID 35 – Constructed Riffle, BCC Reach 2

BCC PID 36 – Constructed Riffle, BCC Reach 2

BCC PID 37 – Constructed Riffle, BCC Reach 2

BCC PID 38 – Constructed Riffle, BCC Reach 2

BCC PID 39 – Constructed Riffle, BCC Reach 2 Start

BCC PID 40 – Constructed Riffle, BCC Reach 1 End

BCC PID 41 – Constructed Riffle, BCC Reach 1

BCC PID 42 – Constructed Riffle, BCC Reach 1 Start

UT1 Photos

UT1 PID 1 – Constructed Riffle, UT1 Reach 4 End

UT1 PID 2 –Constructed Riffle, UT1 Reach 4

UT1 PID 3 – Constructed Riffle, UT1 Reach 4

UT1 PID 4 – Constructed Riffle, UT1 Reach 4

UT1 PID 5 – Riffle Crossing, UT1 Reach 4

UT1 PID 6 – Constructed Riffle, UT1 Reach 4

UT1 PID 7 – Constructed Riffle, UT1 Reach 4

UT1 PID 8 – Constructed Riffle, UT1 Reach 4

UT1 PID 9 – Constructed Riffle, UT1 Reach 4

UT1 PID 10 – Constructed Riffle, UT1 Reach 4

UT1 PID 11 – Constructed Riffle, UT1 Reach 4 Start

UT1 PID 12 – Constructed Riffle, UT1 Reach 3 End

UT1 PID 13 – Constructed Riffle, UT1 Reach 3

UT1 PID 14 – Constructed Riffle, UT1 Reach 3

UT1 PID 15 – Constructed Riffle, UT1 Reach 3

UT1 PID 16 – Constructed Riffle, UT1 Reach 3

UT1 PID 17 – Constructed Riffle, UT1 Reach 3

UT1 PID 18 – Constructed Riffle, UT1 Reach 3

UT1 PID 19 – Constructed Riffle, UT1 Reach 3

UT1 PID 20 – Constructed Riffle, UT1 Reach 3

UT1 PID 21 – Constructed Riffle, UT1 Reach 3

UT1 PID 22 – Constructed Riffle, UT1 Reach 3

UT1 PID 23 – Constructed Riffle, UT1 Reach 3

UT1 PID 24 – Constructed Riffle, UT1 Reach 3

UT1 PID 25 – Constructed Riffle, UT1 Reach 3

UT1 PID 26 – Constructed Riffle, UT1 Reach 3

UT1 PID 27 – Constructed Riffle, UT1 Reach 3

UT1 PID 28 – Log sill step pools (3), UT1 Reach 3

UT1 PID 29 – Constructed Riffle, UT1 Reach 3

UT1 PID 30– Constructed Riffle, UT1 Reach 3 Start

UT1 PID 31 – Constructed Riffle, UT1 Reach 2 End

UT1 PID 32 – Constructed Riffle, UT1 Reach 2

UT1 PID 33 – Constructed Riffle, UT1 Reach 2

UT1 PID 34– Constructed Riffle, UT1 Reach 2

UT1 PID 35 – Constructed Riffle, UT1 Reach 2

UT1 PID 36 – Constructed Riffle, UT1 Reach 2

UT1 PID 37 – Constructed Riffle, UT1 Reach 2

UT1 PID 38 – Constructed Riffle, UT1 Reach 2

UT1 PID 39 – Rock and roll structures (3), UT1 Reach 3

UT1 PID 40 – Constructed Riffle, UT1 Reach 2

UT1 PID 41 – Riffle crossing, UT1 Reach 2 Start

UT1 PID 42 – Constructed Riffle, UT1 Reach 1 End

UT1 PID 43 – Constructed Riffle, UT1 Reach 1

UT1 PID 44 – Constructed Riffle, UT1 Reach 1

UT1 PID 45 – Constructed Riffle, UT1 Reach 1

UT1 PID 46 – Constructed Riffle, UT1 Reach 1

UT1 PID 47 – Constructed Riffle, UT1 Reach 1

UT1 PID 48 – Constructed Riffle, UT1 Reach 1

UT1 PID 49 – Constructed Riffle, UT1 Reach 1

UT1 PID 50 – Constructed Riffle, UT1 Reach 1

UT1 PID 51 – Constructed Riffle, UT1 Reach 1

UT1 PID 52 – Constructed Riffle, UT1 Reach 1

UT1 PID 53 – Constructed Riffle, UT1 Reach 1

UT1 PID 54 – Constructed Riffle, UT1 Reach 1 Start

UT2 Photos

UT2 PID 1 – Constructed Riffle, UT2 End

UT2 PID 2 – Constructed Riffle

UT2 PID 3 – Constructed Riffle

UT2 PID 4 – Constructed Riffle

UT2 PID 5 – Constructed Riffle

UT2 PID 6 – Constructed Riffle

UT2 PID 7 – Constructed Riffle

UT2 PID 8 – Constructed Riffle, UT2 Start

Crest Gauge Photos

BCC Crest Gauge – 3/4/2009

UT1 Crest Gauge – 3/4/2009