

**Upper UT to Cane Creek (Pickard)
Restoration Site
Alamance County, North Carolina
EEP Project #395**



MY-04 Monitoring Report

Data Collected: September, 2012

Submitted: January, 2013



Prepared for:

North Carolina Department of Environment and Natural Resources
Ecosystem Enhancement Program
217 West Jones St, Suite 3000A
Raleigh, NC 27603

**Upper UT to Cane Creek (Pickard)
Restoration Site
EEP Project #395
Alamance County
North Carolina**

**MY-04 Monitoring Report
Prepared By:**



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I. Executive Summary

The Upper UT to Cane Creek (Pickard) Restoration Site (Site) is located in southwest Alamance County approximately 5 miles east of Liberty, North Carolina in United States Geological Survey Hydrologic Unit 03030002050050 (North Carolina Division of Water Quality Subbasin 03-06-04) of the Cape Fear River Basin. This Hydrologic Unit has been identified as a Targeted Local Watershed in NCEEP's *Cape Fear River Basin Restoration Priorities 2009*. The Site was identified to assist the North Carolina Ecosystem Enhancement Program in meeting stream and wetland restoration goals. Primary activities at the Site included stream restoration and wetland enhancement/preservation by excluding livestock from the Site, stabilizing stream banks, installing in-stream structures, adjusting stream plan form, removing invasive species, and replanting riparian areas with native vegetation. Project restoration efforts provided 6783 Stream Mitigation Units and 1.1 riparian riverine Wetland Mitigation Units. The goals and objectives of this project focused on improving local water quality, enhancing flood attenuation, and restoring aquatic and riparian habitat. These goals were accomplished by the following:

1. Reestablished stream stability and the capacity to transport watershed flows and sediment load by restoring stable channel morphology supported by natural instream habitat and grade/bank stabilization structures
2. Reduced nonpoint source sedimentation and nutrient inputs into the Site by eliminating the acceleration of bank erosion as a result of land use activities, excluding livestock, and reestablishing a native riparian buffer greater than 50 feet in width.
3. Enhanced the capacity of the Site to mitigate flood flows by reconnecting the stream to the historic floodplain.

Beaver activity was noted during the initial site survey and stream survey in March 2012, with 8 beaver dams noted throughout the project in the letter dated March 28, 2012. These beaver dams have been removed by NC EEP contract personnel and are currently no longer present on the stream.

Monitoring data, prior to MY-03 (January 2011 and earlier) was adjusted to meet the requirements of the current monitoring template (Version 1.3 1/15/10). The previous monitoring data was adjusted in which the datum was corrected to NAVD 88 to correlate with the vertical datum utilized in the years 3 and 4 data collection. The stream thalweg stationing was also corrected so that all the reach longitudinal profiles display from upstream to downstream and read from left to right.

A cumulative total of 2,963 linear feet out of 6,783 linear feet (44%) of the restored stream was monitored/surveyed via 5 separate monitoring reaches. Overall, the entire site is stable with little change to pattern, profile and geometry. A comparison of longitudinal profiles for all reaches shows little change from the previous MY-03 year monitoring data. Several beaver dams were present during the stream data survey (March 2012) but were removed prior to the subsequent site visit in August 2012. These beaver dams created backwater effects and contributed to the loss of vegetation along the adjacent stream banks. The backwater effects made it difficult to determine the beginning and end of stream features (riffles and pools) due to the lack of flow in the water. The stream banks all remain stable and well vegetated with only one location of

approximately 10 feet of stream bank showing signs of instability (see CCPV). The bank instability in this location is due to livestock access along the stream crossing. The previously noted debris obstructions are still present in several locations throughout the stream. A comparison of stream cross sections to previous monitoring years shows little change to the geometry, further suggesting site stability. Pebble counts were performed in previous monitoring years through a distribution of counts throughout all the features within each reach. The reach pebble counts show slight coarsening in reaches 1 and 3, with significant coarsening in reach 2. The pebble counts for reach 4 shows slight fining, due mostly to the backwater effects of the beaver dams. The reach 5 pebble count remains consistent with the previous year data. The visual assessment concluded that the site exhibits a 100% structure integrity and function.

Fifteen vegetation plots were monitored using Version 4.2 of the CVS-EEP vegetation monitoring protocol. Level II of this protocol was implemented for MY-04 to include both planted and natural woody stems. The success criterion for total woody stems is 320 stems/acre after MY-03. A mortality rate of ten percent will be allowed after MY-04 (288 stems/acre), with another ten percent allowed after MY-05 (260 stems/acre). Based on the CVS vegetation monitoring data for MY-03 there are 12,081 total woody stems/acre including live stakes, planted stems, and natural stems. Counting only planted stems and excluding livestakes, there are 472 stems/acre. While all the vegetation plots combined meet the criteria for total stems, planted stem counts for plots 4, 10, and 12 had planted stem counts below the 320 stems/acre (Table 9). Data collected for the vegetation monitoring plots are in Appendix C.

Vegetation problem areas consist of areas with low stem densities, bare areas with limited herbaceous and woody stem coverage, and invasive exotic plants. Most of the areas with low stem densities are located beyond the 50ft stream buffer in the upland areas mainly consisting of old pastures where tall fescue (*Schedonurus arundinaceus*) dominates the herb layer. Bare areas have little to no herbaceous cover with stunted woody stems if present likely due to a combination of infertile soils and disturbed soils from construction. Invasive exotics of concern and recorded as vegetation problem areas within the conservation easement include multiflora rose (*Rosa multiflora*) and Chinese privet (*Ligustrum sinense*). Multiflora rose was observed sparsely patchy throughout the conservation easement. Chinese privet was also sparsely patchy throughout the conservation easement concentrated mostly along the forest edge within Reach 5. Other invasive exotics observed include Japanese honeysuckle (*Lonicera japonica*), Japanese stiltgrass (*Microstegium vimineum*), and tall fescue. Japanese honeysuckle was patchy in areas along the forest edge throughout the conservation easement. Japanese stiltgrass was also patchy throughout the conservation easement. Tall fescue was located in the uplands where pastures were previous to construction. Although these species have different ranks of severity, the functionality of the project is not expected to be impaired significantly. It is likely that all of these species were present in and adjacent to the conservation easement prior to construction.

Summary information/data related to the occurrence of items such as beaver encroachment and statistics related to performance of various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the Baseline Monitoring Report (formerly Mitigation Plan) and in the Mitigation Plan (formerly Restoration Plan) documents available on

EEP's website. All raw data supporting the tables and figures in the appendices are available from EEP upon request.

II. Methodology

Methodologies follow EEP monitoring report template Version 1.3.1 (01/15/10) and CVS –EEP Protocol for Recording Vegetation (Lee et al 2008). Photos were taken with a digital camera. A Trimble Geo XT handheld unit with sub-meter accuracy was used to collect vegetation area locations.

A. Vegetation Methodologies

Fifteen vegetation monitoring plots were monitored on September 5, 2012 according to Level II of the EEP/CSV Protocol for Recording Vegetation Version 4.2, which includes both natural and woody stems. The vegetation plots are 10 meters square and marked with metal fence posts at each corner, and an additional 1” diameter PVC pipe marking each plot origin. Data collected for these plots are in Appendix C. *Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas* (Weakley 2011) was used as the taxonomic standard for vegetation. See figures in Appendix A for monitoring plot locations.

B. Stream Methodologies

Stream profile and cross-sections were surveyed on March 13, 2012 using total station equipment and methods. The survey data was plotted using AutoCAD Civil3D. The longitudinal profile was generated using individual reach alignments. Cross sectional data was extracted based on a linear alignment between the end pins. Cross section bankfull elevations for yearly comparisons are based on the baseline bankfull elevation established for each cross section.

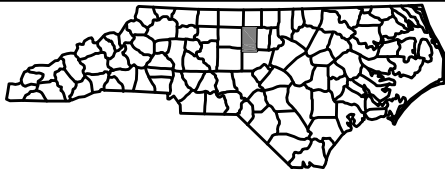
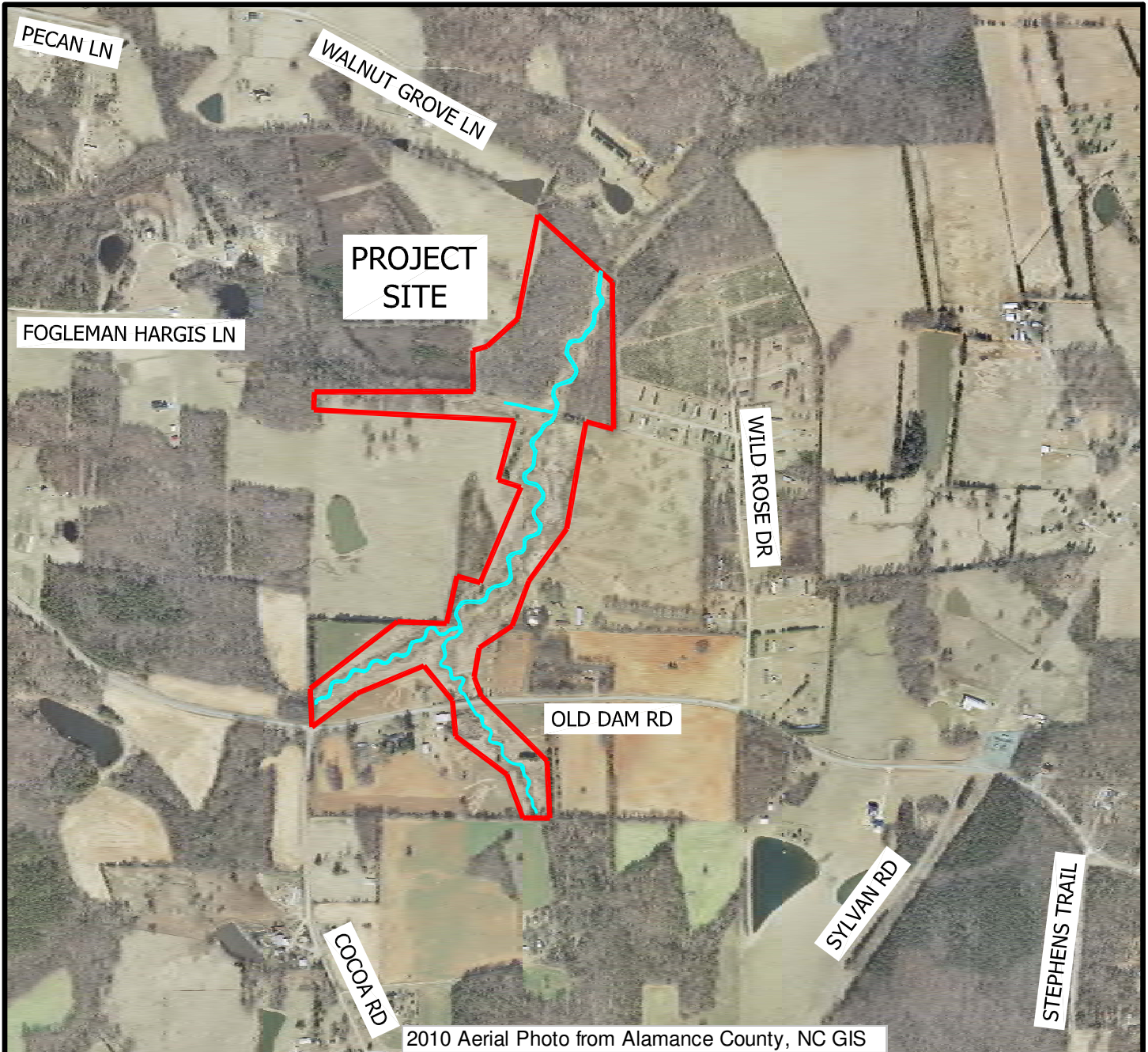
III. References

Lee, Michael T. Peet, Robert K. Roberts, Steven D., Wentworth, Thomas R. (2008). *CVS-EEP Protocol for Recording Vegetation Version 4.2*.

Weakley, Alan (2007). *Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas*.
<http://www.herbarium.unc.edu/flora.htm>.

Wolman, M.G., 1954. A Method of Sampling Coarse River-Bed Material, *Transactions of American Geophysical Union* 35:951-956.

Appendix A. Project Vicinity Map and Background Tables



North Carolina – Ecosystem Enhancement Program

Upper UT to Cane Creek (Pickard)
 Alamance County, North Carolina
 EEP ID #395

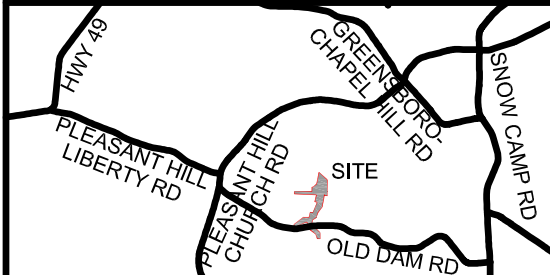
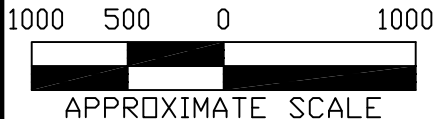


FIGURE 1
UPPER UT TO CANE CREEK
(PICKARD)
AERIAL VICINITY MAP



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Table 1. Project Components Upper UT to Cane Creek (Pickard) / EEP# 395									
Project Component or Reach ID	Existing Feet/Acre s	Restorati on Level	Approa ch	Footage or Acreage	Stationing	Mitigat ion Ratio	Mitigation Units	BMP Eleme nts ¹	Comment
Reach A	1430	R	P1	1810.76 lf	10+00-28+10.76	1:1	1738.76		Excludes 72-foot ROW at Old Dam Rd
Reach B	2065	R	P1	2118.69 lf	28+10.76-49+29.45	1:1	2118.69		
Reach C	1435	R	P2	1194.58 lf	49+29.45-61+24.03	1:1	1194.58		
Reach D	1100	R	P1	1357.31 lf	100+00-113.57.31	1:1	1357.31		
Reach E	300	R	P1	373.25 lf	200+00-203+73.25	1:1	373.25		
Wetlands	1.3	E		1.3 Ac		2:1	0.65		
Wetlands	2	P		2 Ac		5:1	0.4		

1 = BR = Bioretention Cell; SF = Sand Filter; SW = Stormwater Wetland; WDP = Wet Detention Pond; DDP = Dry Detention Pond; FS = Filter Strip; Grassed Swale = S; LS = Level Spreader; NI = Natural Infiltration Area, O = Other; CF = Cattle Fencing; WS = Watering System; CH = Livestock Housing

Table 1b. Component Summations Upper UT to Cane Creek (Pickard) / EEP# 395							
Restoration Level	Stream (lf)	Riparian Wetland (Ac)		Non-Ripar (Ac)	Upland (Ac)	Buffer (Ac)	BMP
		Riverine	Non-Riverine				
Restoration	6782.59						
Enhancement		1.3					
Enhancement I							
Enhancement II							
Creation							
Preservation		2					
HQ Preservation							
Totals (Feet/Acres)	6782.59	3.3		0	0	41	
MU Totals	6783	1.1		0	0	0	
	Non-Applicable						

**Table 2. Project Activity and Reporting History
Upper UT to Cane Creek (Pickard) / EEP# 395**

Elapsed Time Since Grading Complete: 3 yrs 8 months
Elapsed Time Since Planting Complete: 3 yrs 8 Months
Number of Reporting Years¹: 4

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Restoration Plan		Feb-06
Construction		Mar-09
Site Planting		Mar-09
As-built Drawings		Mar-09
Mitigation Plan (Year 0 Monitoring – baseline)	July-Oct 2008	July-09
Year 1 Monitoring	Oct-09	Nov-09
Year 2 Monitoring	Sep-10	Jan-11
Year 3 Monitoring	Aug-11	Dec-11
Year 4 Monitoring	Sep-12	Nov-12
Year 5 Monitoring		

Bolded items are examples of those items that are not standard, but may come up and should be included. Non-bolded items represent events that are standard components over the course of a typical project. The above are obviously not the extent of potential relevant project activities, but are just provided as example as part of this exhibit. If planting and morphology are on split monitoring schedules that should be made clear in the table.

¹ = Equals the number of reports or data points produced excluding the baseline

Table 3. Project Contacts Table Upper UT to Cane Creek (Pickard) / EEP# 395	
Designer Primary project design POC	URS Corporation 1600 Perimeter Park Drive, Suite 400 Morrisville, North Carolina 27560 Kathleen McKeithan (919) 461-1597
Construction Contractor Construction contractor POC	River Works, Inc. 8000 Regency Parkway, Suite 200 Cary, North Carolina 27511 Will Pederson (919) 459-9001
Survey Contractor Survey contractor POC	Level Cross Surveying, PLLC 668 Marsh County Lane Randleman, North Carolina 23717 Sherri Willard (336) 495-1713
Planting Contractor Planting contractor POC	Habitat Assessment & Restoration Program, Inc. 9305-D Monroe Road Charlotte, North Carolina 28270 Karri Blackmon (704) 841-2841
Seeding Contractor Contractor point of contact	River Works, Inc. 8000 Regency Parkway, Suite 200 Cary, North Carolina 27511 Will Pederson (919) 459-9001
Seed Mix Sources	Green Resource Colfax, NC Rodney Montgomery (336-855-6363
Nursery Stock Suppliers	Strader Fencing, Inc. Julian, NC Kenneth Strader (336)-697-5715
Monitoring Performers Stream Monitoring POC	Ward Consulting Engineers, P.C. 8368 Six Forks Road Suite 104 Raleigh, NC 27615-5083 Becky Ward 919-870-0526
Vegetation Monitoring POC	Chris Sheats - The Catena Group - 919-732-1300
Wetland Monitoring POC	Chris Sheats - The Catena Group - 919-732-1300

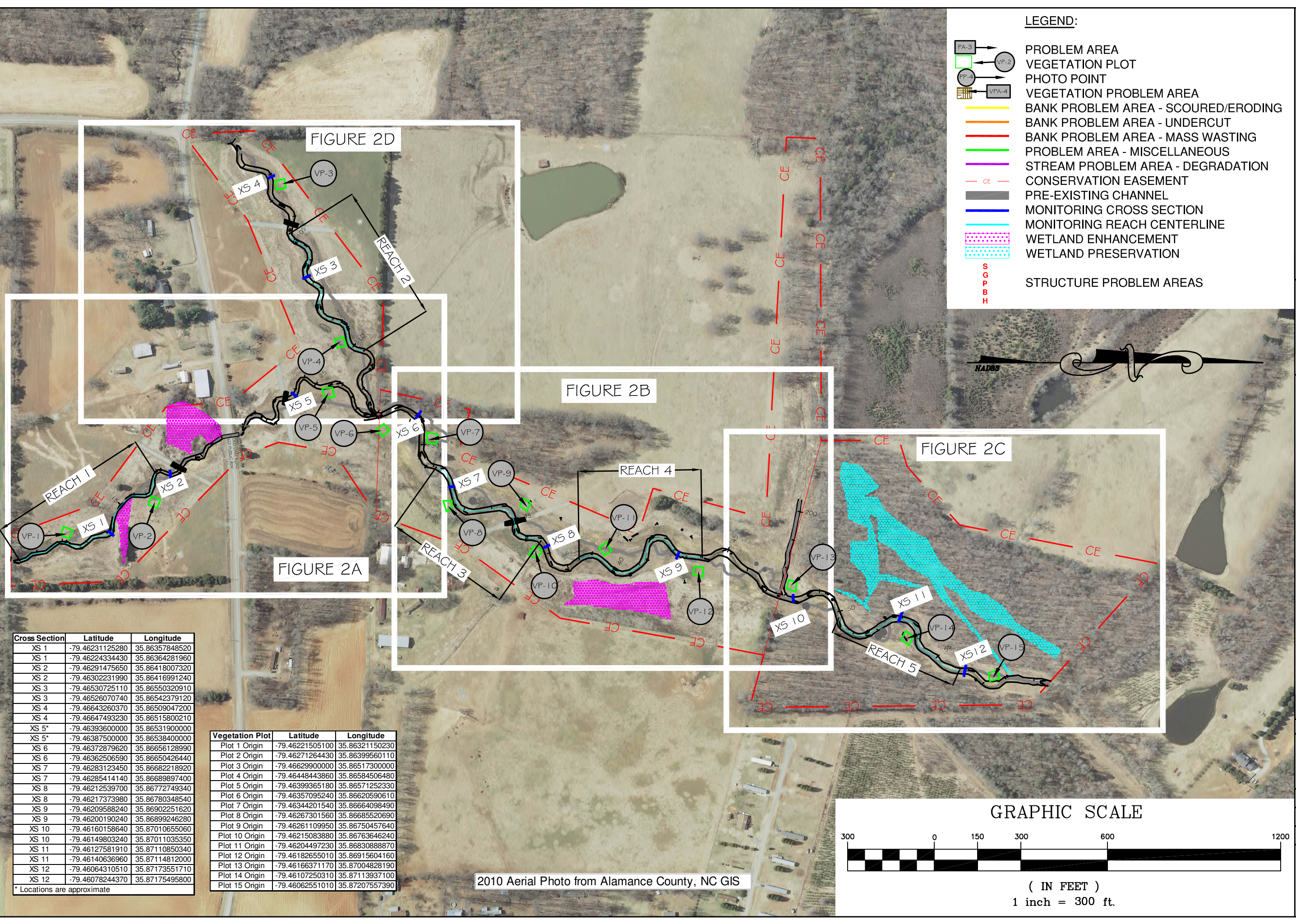
**Table 4. Project Attribute Table
Upper UT to Cane Creek (Pickard) / EEP# 395**

Project County	Alamance County, North Carolina				
Physiographic Region	Piedmont				
Ecoregion	Carolina Slate Belt				
Project River Basin	Cape Fear				
USGS HUC for Project (14 digit)	3030002050050				
NCDWQ Sub-basin for Project	3/6/2004				
Within extent of EEP Watershed Plan?	Cape Fear River Basin Restoration Priorities 2009				
WRC Hab Class (Warm, Cool, Cold)	Warm				
% of project easement fenced or demarcated	100%				
Beaver activity observed during design phase?	No				
Restoration Component Attribute Table					
	Reach A	Reach B	Reach C	Reach D	Reach E
Drainage area	390	1333	1640	892	282
Stream order	first	third	third	third	second
Restored length (feet)	1738.76	2118.69	1194.58	1357.31	373.25
Perennial or Intermittent	perennial	perennial	perennial	perennial	perennial
Watershed type (Rural, Urban, Developing etc.)	Rural				
Watershed LULC Distribution (e.g.)					
Managed Herbaceous Coverage	49.8				
Mixed Upland Hardwoods	31.4				
Cultivated	9.9				
Southern Yellow Pine	4.6				
Deciduous Shrubland	2				
Mixed Hardwoods/Conifers	0.9				
Unmanaged Herbaceous Upland	0.6				
Evergreen Shrubland	0.4				
Water Bodies	0.4				
Etc.					
Watershed impervious cover (%)	<0.1				
NCDWQ AU/Index number	16-28				
NCDWQ classification	C, NSW				
303d listed?	No				
Upstream of a 303d listed segment?	No				
Reasons for 303d listing or stressor	N/A				
Total acreage of easement	50.75				
Total vegetated acreage within the easement	-	-	-	-	-
Total planted acreage as part of the restoration	41				
Rosgen classification of pre-existing	Degraded E4	Degraded E4	Degraded E4	Degraded E4	Degraded E4
Rosgen classification of As-built	E4	E4	E4	E4	E4
Valley type	VIII	VIII	VIII	VIII	VIII
Valley slope	0.0083	0.0041	0.0045	0.0046	0.0156
Valley side slope range (e.g. 2-3.%)	-	-	-	-	-
Valley toe slope range (e.g. 2-3.%)	-	-	-	-	-
Cowardin classification	R3UB1	R3UB1	R3UB1	R3UB1	R3UB1
Trout waters designation	No	No	No	No	No
Species of concern, endangered etc.? (Y/N)	No	No	No	No	No
Dominant soil series and characteristics	Tirzah silt loam, Georgeville silt loam, Starr loam, Colfax silt loam, Herndon silt loam, and mixed alluvial land				
Series					
Depth	-	-	-	-	-
Clay%	-	-	-	-	-
K	-	-	-	-	-
T	-	-	-	-	-

Use N/A for items that may not apply. Use "--" for items that are unavailable and "U" for items that are unknown

Appendix B. Visual Assessment Data

S:\Projects\EEP-Ecosystem Enhancement Program\EEP Monitoring\Proj 2010-2012 PM\395\Upper UT to Cane Creek (Pickard)\2012 MY-04\Drawings\UT Cane (Pickard) MY4 2012 Project Folder\dwg\Upper UT to Cane Creek (Pickard)3-

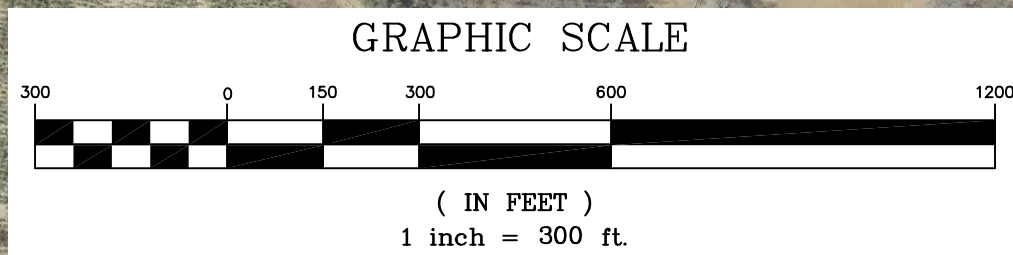


- LEGEND:**
- PA-3 PROBLEM AREA
 - VP-2 VEGETATION PLOT
 - PP-# PHOTO POINT
 - VFA-4 VEGETATION PROBLEM AREA
 - BANK PROBLEM AREA - SCOURED/ERODING
 - BANK PROBLEM AREA - UNDERCUT
 - BANK PROBLEM AREA - MASS WASTING
 - PROBLEM AREA - MISCELLANEOUS
 - STREAM PROBLEM AREA - DEGRADATION
 - CE CONSERVATION EASEMENT
 - PRE-EXISTING CHANNEL
 - MONITORING CROSS SECTION
 - MONITORING REACH CENTERLINE
 - WETLAND ENHANCEMENT
 - WETLAND PRESERVATION
 - S G P B H STRUCTURE PROBLEM AREAS

Cross Section	Latitude	Longitude
XS 1	-79.46231125280	35.86357848520
XS 1	-79.46224334430	35.86364281960
XS 2	-79.46291475650	35.86418007320
XS 2	-79.46302231990	35.86416991240
XS 3	-79.46530725110	35.86550320910
XS 3	-79.46526070740	35.86542379120
XS 4	-79.46643260370	35.86509047200
XS 4	-79.46647493230	35.86515800210
XS 5*	-79.46393600000	35.86531900000
XS 5*	-79.46387500000	35.86538400000
XS 6	-79.46372879620	35.86656128990
XS 6	-79.46362506590	35.86650426440
XS 7	-79.46283123450	35.86682218920
XS 7	-79.46285414140	35.86689897400
XS 8	-79.46212539700	35.86772749340
XS 8	-79.46217373980	35.86780348540
XS 9	-79.46209588240	35.86902251620
XS 9	-79.46200190240	35.86899246280
XS 10	-79.46160158640	35.87010655060
XS 10	-79.46149803240	35.87011035350
XS 11	-79.46127581910	35.87110850340
XS 11	-79.46140636960	35.87114812000
XS 12	-79.46064310510	35.87173551710
XS 12	-79.46078244370	35.87175495800

Vegetation Plot	Latitude	Longitude
Plot 1 Origin	-79.46221505100	35.86321150230
Plot 2 Origin	-79.46271264430	35.86399560110
Plot 3 Origin	-79.46629900000	35.86517300000
Plot 4 Origin	-79.46448443860	35.86584506480
Plot 5 Origin	-79.46399365180	35.86571252330
Plot 6 Origin	-79.46357095240	35.86620590610
Plot 7 Origin	-79.46344201540	35.86664098490
Plot 8 Origin	-79.46267301560	35.86685520690
Plot 9 Origin	-79.46261109950	35.86750457640
Plot 10 Origin	-79.46215083880	35.86763646240
Plot 11 Origin	-79.46204497230	35.86830888870
Plot 12 Origin	-79.46182655010	35.86915604160
Plot 13 Origin	-79.46166371170	35.87004828190
Plot 14 Origin	-79.46107250310	35.87113937100
Plot 15 Origin	-79.46062551010	35.87207557390

2010 Aerial Photo from Alamance County, NC GIS



UPPER UT to CANE CREEK (PICKARD) (EEP #395) CURRENT CONDITIONS PLAN VIEW

ALAMANCE COUNTY, NORTH CAROLINA

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FAX (919) 870-5359

















WCE
Ecosystem Enhancement Program

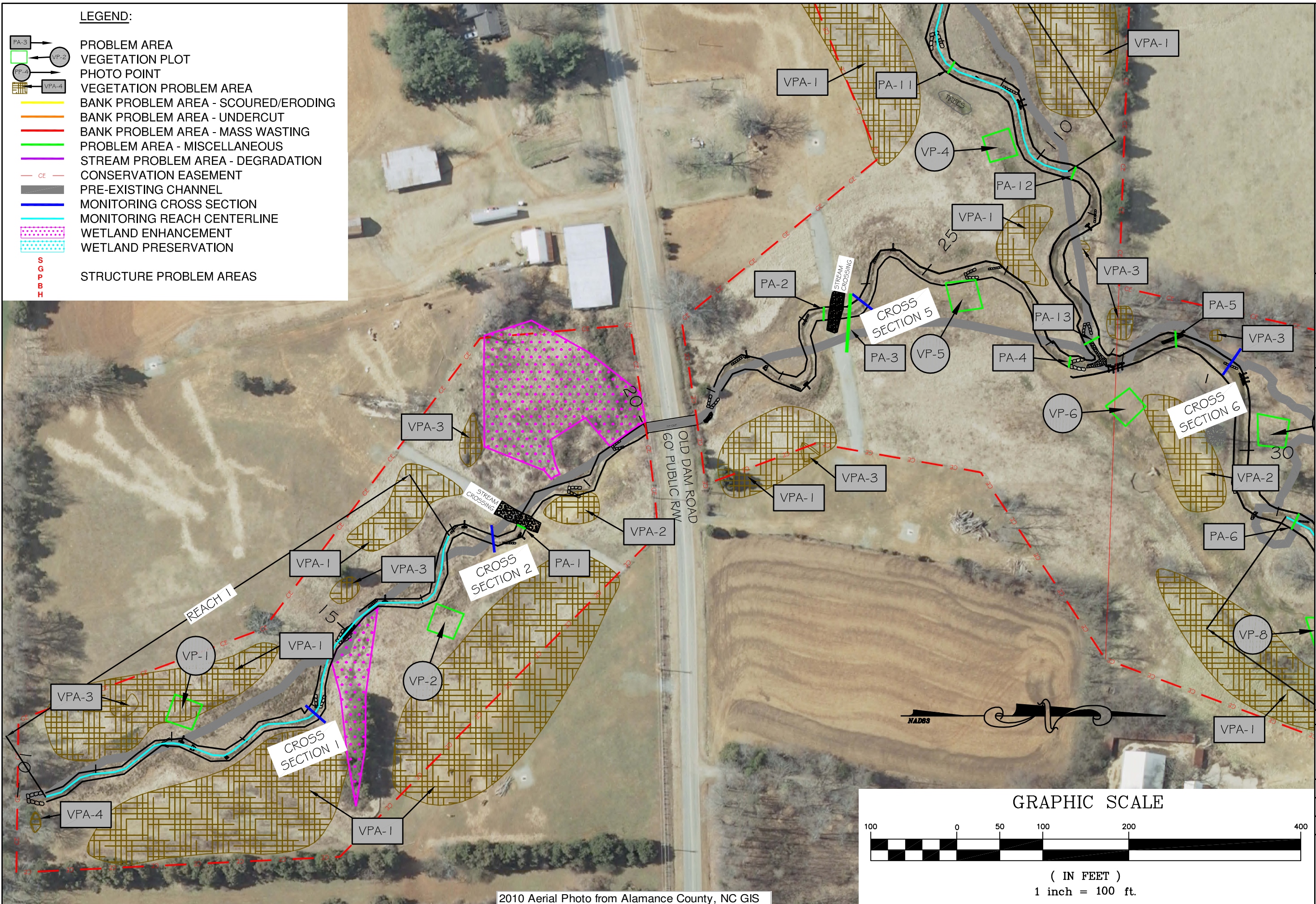
DATE: 27 November 2012
REVISIONS:
PROJECT NAME: UPPER UT to CANE CREEK
DWG NAME: CCPV
SCALE: 1" = 300'
SHEET NO.

FIGURE 2 OVERALL

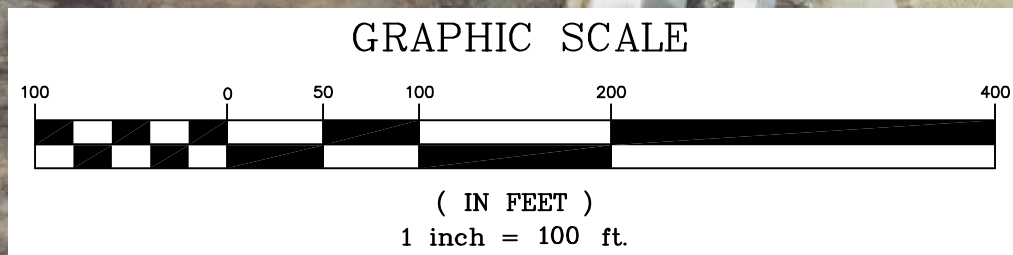
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LEGEND:

-  PROBLEM AREA
-  VEGETATION PLOT
-  PHOTO POINT
-  VEGETATION PROBLEM AREA
-  BANK PROBLEM AREA - SCOURED/ERODING
-  BANK PROBLEM AREA - UNDERCUT
-  BANK PROBLEM AREA - MASS WASTING
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-  CONSERVATION EASEMENT
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-  WETLAND PRESERVATION
-  STRUCTURE PROBLEM AREAS



2010 Aerial Photo from Alamance County, NC GIS



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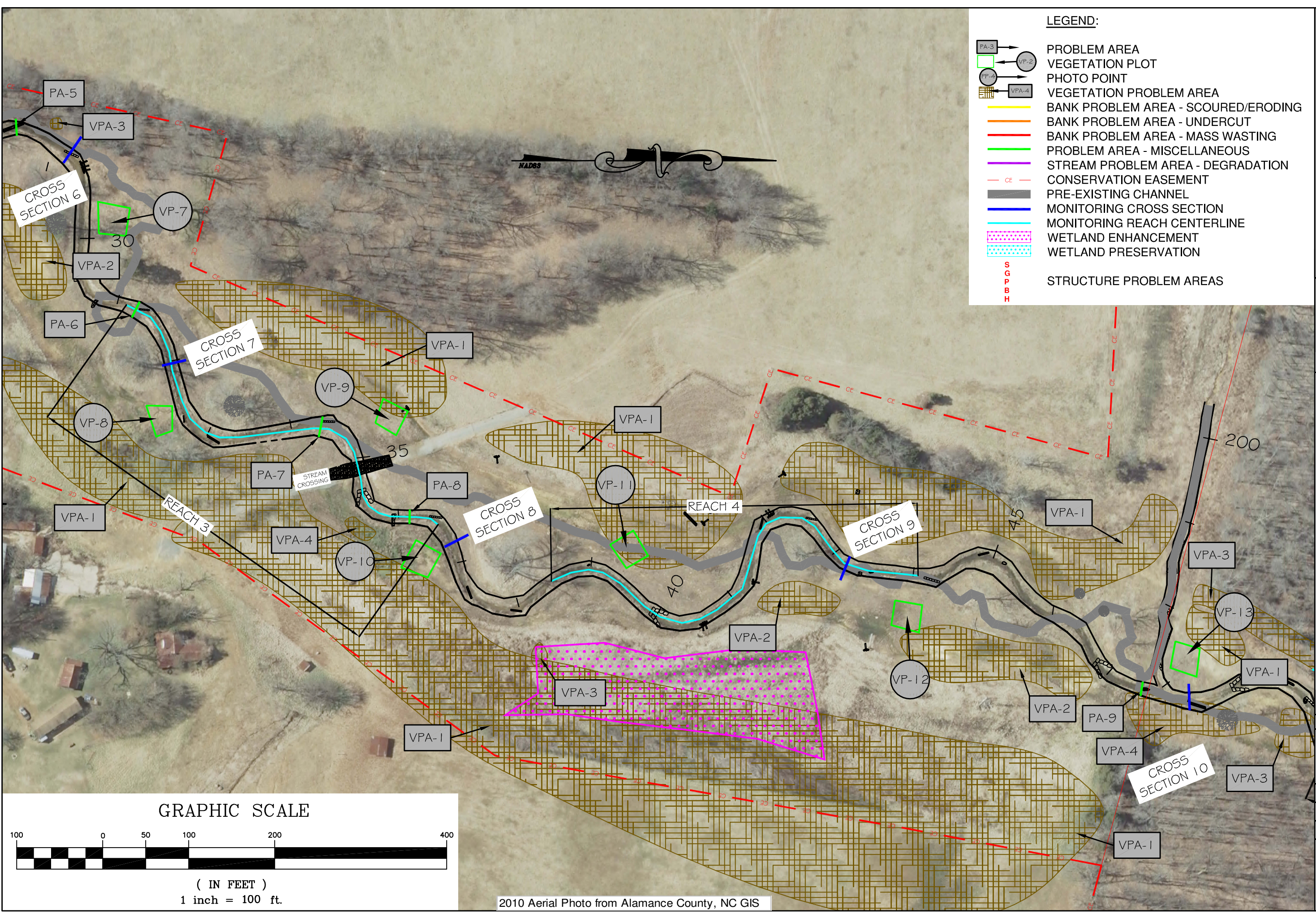


**UPPER UT to CANE CREEK
 (PICKARD) (EEP #395)
 CURRENT CONDITIONS PLAN VIEW
 ALAMANCE COUNTY, NORTH CAROLINA**

DATE:	27 November 2012
REVISIONS:	
PROJECT NAME:	UPPER UT to CANE CREEK
DWG NAME:	CCPV
SCALE:	1' = 100'
SHEET NO.	

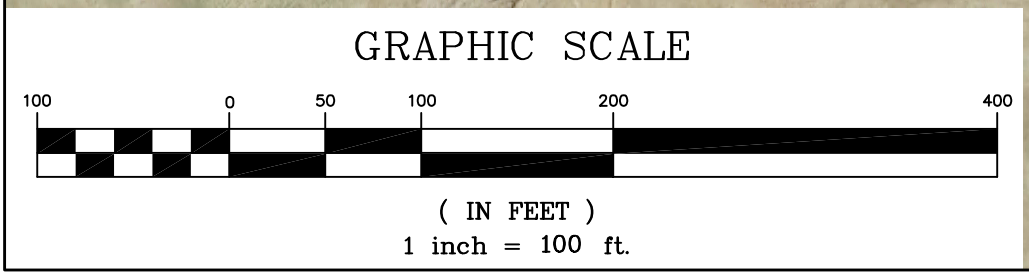
FIGURE 2A

S:\Projects\EEP-Ecosystem Enhancement Program\EEP Monitoring\Proj 2010-2012 PM\395\Upper UT to Cane Creek (Pickard)\2012 MY-04\Drawings\UT Cane (Pickard) MY4 2012 Project Folder\dwg\Upper UT to Cane Creek (Pickard)-3



LEGEND:

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- PHOTO POINT
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- WETLAND ENHANCEMENT
- WETLAND PRESERVATION
- STRUCTURE PROBLEM AREAS



2010 Aerial Photo from Alamance County, NC GIS

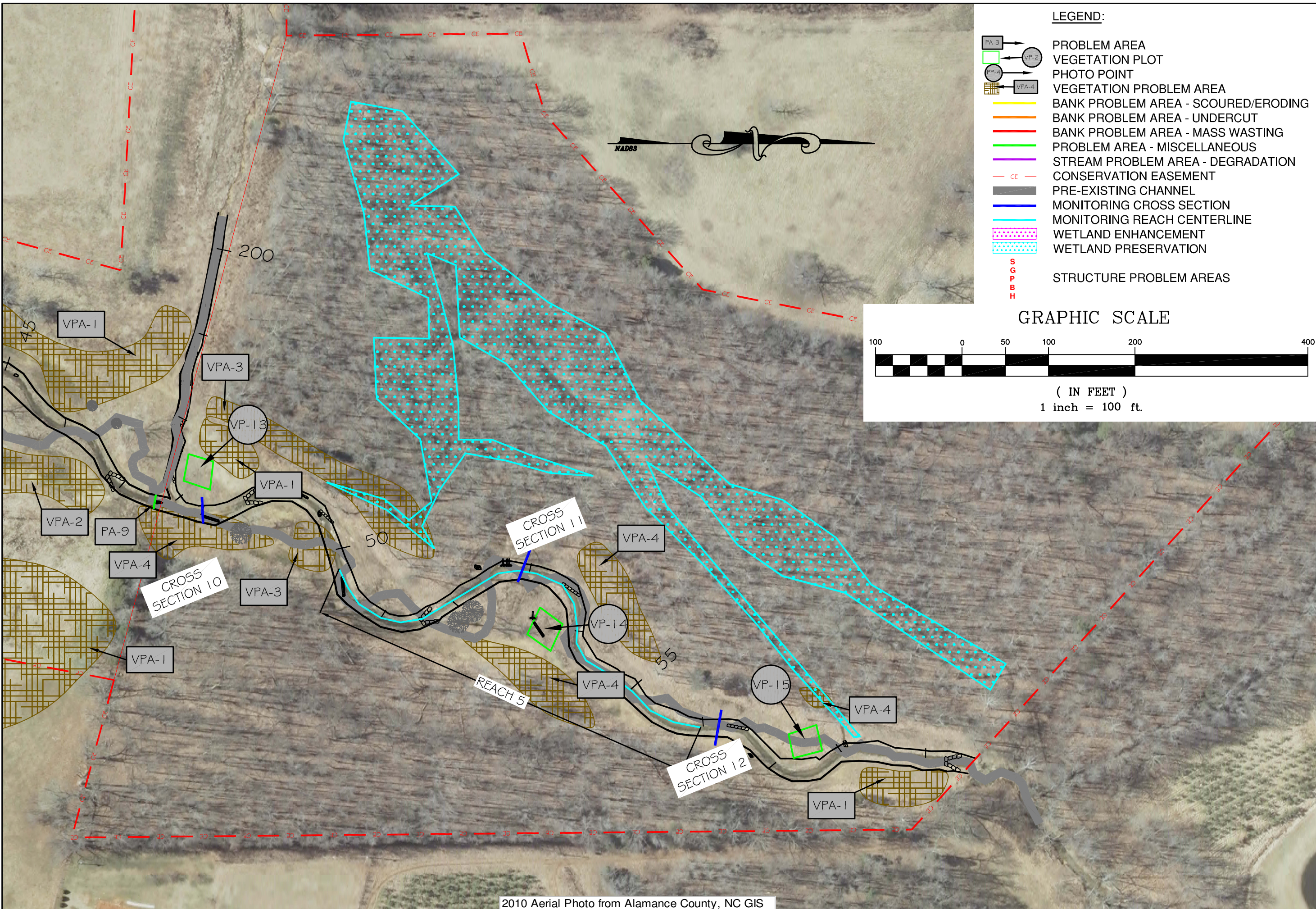
Ward Consulting Engineers, P.C.
8368 Six Forks Rd, Suite 104
Raleigh, NC 27615-5083
(919) 870-0526
FAX (919) 870-5359

Upper UT to Cane Creek (Pickard) (EEP #395)
CURRENT CONDITIONS PLAN VIEW
ALAMANCE COUNTY, NORTH CAROLINA

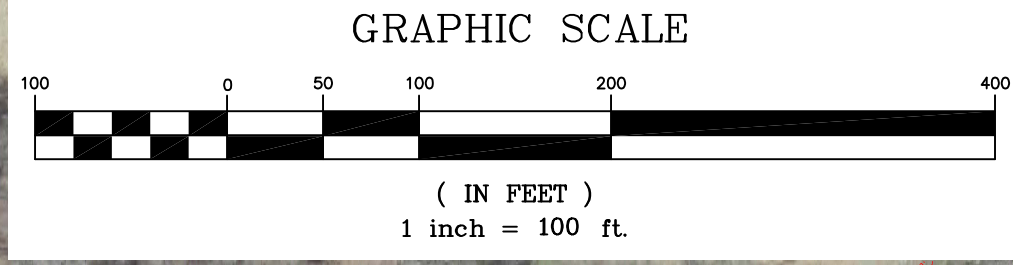
DATE: 27 November 2012
REVISIONS:
PROJECT NAME: UPPER UT to Cane Creek
DWG NAME: CCPV
SCALE: 1" = 100'
SHEET NO.

FIGURE 2B

S:\Projects\EEP-Ecosystem Enhancement Program\EEP Monitoring\Proj 2010-2012 PM\395\Upper UT to Cane Creek (Pickard)\2012 MY-04\Drawings\UT Cane (Pickard)\MY4 2012 Project Folder\dwg\Upper UT to Cane Creek (Pickard)-3



- LEGEND:**
- PA-3 → PROBLEM AREA
 - VP-2 → VEGETATION PLOT
 - PF-1 → PHOTO POINT
 - VPA-4 → VEGETATION PROBLEM AREA
 - (Yellow) — BANK PROBLEM AREA - SCOURED/ERODING
 - (Orange) — BANK PROBLEM AREA - UNDERCUT
 - (Red) — BANK PROBLEM AREA - MASS WASTING
 - (Green) — PROBLEM AREA - MISCELLANEOUS
 - (Purple) — STREAM PROBLEM AREA - DEGRADATION
 - - - (Red) - - - CONSERVATION EASEMENT
 - (Black) — PRE-EXISTING CHANNEL
 - (Blue) — MONITORING CROSS SECTION
 - (Cyan) — MONITORING REACH CENTERLINE
 - (Pink Dotted) — WETLAND ENHANCEMENT
 - (Cyan Dotted) — WETLAND PRESERVATION
 - S
G
P
B
H → STRUCTURE PROBLEM AREAS



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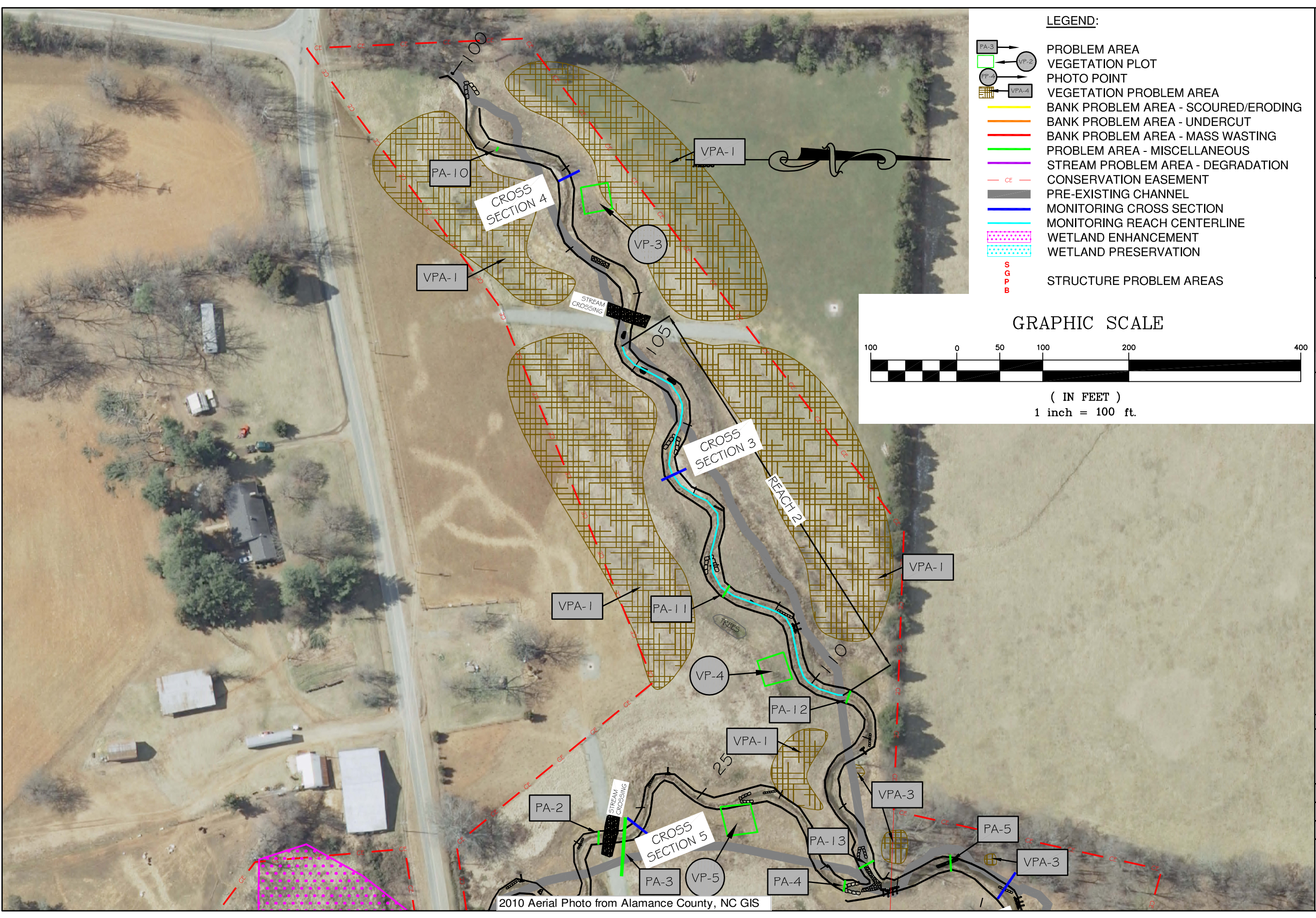


**UPPER UT to CANE CREEK
 (PICKARD) (EEP #395)
 CURRENT CONDITIONS PLAN VIEW
 ALAMANCE COUNTY, NORTH CAROLINA**

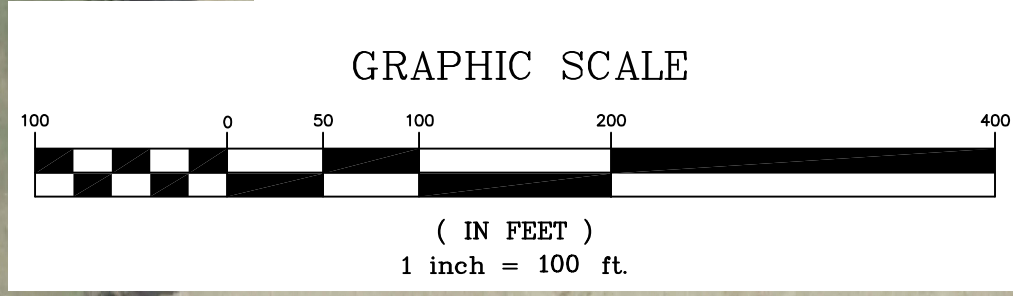
DATE:	27 November 2012
REVISIONS:	
PROJECT NAME:	UPPER UT to CANE CREEK
DWG NAME:	CCPV
SCALE:	1" = 100'
SHEET NO.	

FIGURE 2C

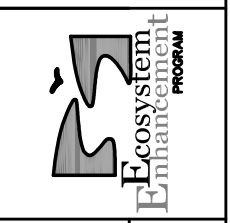
S:\Projects\EEP-Ecosystem Enhancement Program\EEP Monitoring\Proj 2010-2012 PM\395) Upper UT to Cane Creek (Pickard) MY4 2012 Project Folder\dwg\Upper UT to Cane Creek (Pickard)3



- LEGEND:**
- PA-3 → PROBLEM AREA
 - VP-2 → VEGETATION PLOT
 - PP-1 → PHOTO POINT
 - VPA-4 → VEGETATION PROBLEM AREA
 - (Yellow) — BANK PROBLEM AREA - SCOURED/ERODING
 - (Orange) — BANK PROBLEM AREA - UNDERCUT
 - (Red) — BANK PROBLEM AREA - MASS WASTING
 - (Green) — PROBLEM AREA - MISCELLANEOUS
 - (Purple) — STREAM PROBLEM AREA - DEGRADATION
 - - - (Red) - - - CE CONSERVATION EASEMENT
 - (Grey) — PRE-EXISTING CHANNEL
 - (Blue) — MONITORING CROSS SECTION
 - (Cyan) — MONITORING REACH CENTERLINE
 - (Pink Dotted) — WETLAND ENHANCEMENT
 - (Blue Dotted) — WETLAND PRESERVATION
 - S
P
G
B → STRUCTURE PROBLEM AREAS



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**UPPER UT to CANE CREEK
 (PICKARD) (EEP #395)
 CURRENT CONDITIONS PLAN VIEW
 ALAMANCE COUNTY, NORTH CAROLINA**

DATE:	27 November 2012
REVISIONS:	
PROJECT NAME:	UPPER UT to CANE CREEK
DWG NAME:	CCPV
SCALE:	1' = 100'
SHEET NO.	

FIGURE 2D

2010 Aerial Photo from Alamance County, NC GIS

Table 5
 Reach ID
 Assessed Length

Visual Stream Morphology Stability Assessment
 Reach 1 (Sta 10+33 - 16+93) Stream Design Reach A
 641

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)					100%			
		2. <u>Degradation</u> - Evidence of downcutting					100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	9	11			82%			
		3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	9			11			
			2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	9			11			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	10	11			91%			
2. Thalweg centering at downstream of meander (Glide)		10	11	91%						
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion							100%	
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.					100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse					100%			100%
Totals					0	0	100%	0	0	100%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	8	8			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	6	6			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	6	6			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	8	8			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	8	8			100%			

Table 5
 Reach ID
 Assessed Length

Visual Stream Morphology Stability Assessment
 Reach 2 (Sta 104+65 - 110+40) Stream Design Reach D
 587

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)					100%			
		2. <u>Degradation</u> - Evidence of downcutting					100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	7	7			100%			
		3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	7	7					
	2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)		7	7			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	7	7			100%			
		2. Thalweg centering at downstream of meander (Glide)	7	7			100%			
	Totals					0	0			
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion					100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.					100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse					100%			100%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	6	6			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	4	4			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	4	4			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	6	6			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	6	6			100%			

Table 5
 Reach ID
 Assessed Length

Visual Stream Morphology Stability Assessment
 Reach 3 (Sta 31+11 - 36+48) Stream Design Reach B
 531

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)					100%			
		2. <u>Degradation</u> - Evidence of downcutting					100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	4	5			80%			
	3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	4	4			100%			
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	4	4			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	5	5			100%			
2. Thalweg centering at downstream of meander (Glide)		5	5	100%						
Totals										
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			1	10	99%	1	10	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.					100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse					100%			100%
Totals										
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	5	5			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	5	5			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	5	5			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	5	5			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	5	5			100%			

Table 5
 Reach ID
 Assessed Length

Visual Stream Morphology Stability Assessment
 Reach 4 (Sta 38+49 - 44+06) Stream Design Reach B
 570

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)					100%			
		2. <u>Degradation</u> - Evidence of downcutting					100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	5	5			100%			
		3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	4	4					
	2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)		4	4			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	5	5			100%			
2. Thalweg centering at downstream of meander (Glide)		5	5			100%				
Totals										
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion					100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.					100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse					100%			100%
Totals										
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	6	6			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	3	3			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	3	3			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	6	6			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	6	6			100%			

Table 5
 Reach ID
 Assessed Length

Visual Stream Morphology Stability Assessment
 Reach 5 (Sta 50+23 - 55+97) Stream Design Reach C
 634

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)					100%			
		2. <u>Degradation</u> - Evidence of downcutting					100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	5	5			100%			
		3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	4	5					
	2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)		5	5			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	5	5			100%			
2. Thalweg centering at downstream of meander (Glide)		5	5			100%				
Totals										
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion					100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.					100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse					100%			100%
Totals										
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	4	4			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	3	3			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	3	3			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	4	4			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	4	4			100%			

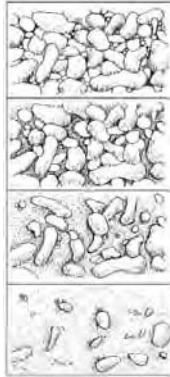
Criteria, Definitions and Thresholds for Visual Stream Morphology Assessments

Major Channel Category	Channel Sub-Category	Metric	Definitions	Cataloging Threshold	CCPV Depiction								
1. Bed	1. Vertical Stability (Riffle and Run units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)	Aggradation refers to at least moderate increases in reach stored sediment. It is NOT simply constituted by minor fining of riffles or filling of pools at or below baseflow elevations. An aggrading reach is often characterized by sand or gravel bar formation/growth with associated fining of reach substrate and smoothing of the reach long profile. Bars/aggraded areas significant enough to deflect flow against banks should be catalogued. Repeat channel photopoints are a key tool in assessing project aggradation. (See photo exhibit 1 below for range of example bar development/aggradation)	Catalog only if feature has most of the characteristics described to the left (cell E11) and is at least 15 feet in length or 20% of the riffle/run length, whichever is less.	NA								
		2. <u>Degradation</u> - Number and size of evident downcuts within Riffle/Run units.	Where projects have regularly-spaced engineered grade control, degradation/downcutting is expected only in short, discreet lengths. Indicators include perched sill structures, channel bed "steps" in clay-rich parent material, evidence of bed retreat at the bank toe (parent material may be exposed); mobilization of coarse riffle substrate into pools downstream, and perhaps riffles with run morphology. Long-profile surveys should support an assessment of bed degradation where the visual assessment and survey overlap.	Catalog only if feature has most of the characteristics described to the left (cell E12) and is at least 15 feet in length or 20% of the riffle/run length, whichever is less.	Dark Red or Purple Color to be certain to distinguish from Mass Wasting Color Code								
	2. Riffle Condition	1. <u>Texture</u>	Riffles should maintain a coarseness similar to the design distribution. Significant fining of the riffle surface indicates non-attainment for the riffle. Repeat pebble counts should support an assessment of riffle fining where overlap occurs (see exhibit graphic 2 below describing embedding for gravel-cobble systems).	NA	NA								
	3. Meander Pool Condition	1. <u>Depth</u> Sufficient?	This metric is used to assess meander pools and also step-pools along a Rosgen B-type channel reaches. For stepped reaches the pools will be evaluated and tallied here and under the Habitat Sub-Category below. The max pool bankfull depth should be 1.6 times the mean bankfull depth (Max Pool Depth : Mean Bankfull Depth > 1.6). The mean bankfull depth from the As-built/baseline survey can be utilized to make this determination. Exhibit 3 provides residual pool depths using the 1.6 multiplier for a range of mean channel riffle depths that typify restoration projects.	NA	NA								
		2. <u>Length</u> appropriate?	This metric will only be applied to meander pools. The meander pool length should be >30% of the ~ linear centerline distance between the tail of the upstream riffle and the head of the downstream riffle.	NA	NA								
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)?	This metric is used to characterize flow paths along riffle-run-pool transitions. The thalweg is expected to be against the outer bank in the bend apex, but vectors oriented towards the outer bank too far above the bend apex may indicate the potential for increased bank erosion. Similarly, the pool-glide-riffle transition is also expected to demonstrate flow path centering (Metric 4.2 below). The current-year thalweg rendered on the CCPV figure can assist in this assessment.	NA	NA								
		2. Thalweg centering at downstream of meander bend (Glide)?	See Metric 4.1 above	NA	NA								
	2. Bank	1. Scoured/Eroding Bank	Banks with evident scour /erosion		<table border="1"> <thead> <tr> <th>Bank Height</th> <th>Minimum Length</th> </tr> </thead> <tbody> <tr> <td>>6</td> <td>6</td> </tr> <tr> <td>3-6</td> <td>8</td> </tr> <tr> <td><3</td> <td>10</td> </tr> </tbody> </table> <p>See Footnote/Exhibit 5 below also</p> <p>This table provides a guide for working thresholds for bank erosion cataloging/mapping based on bank height. For the bank height ranges above, the minimum length of bank to be mapped and tallied is specified. For example, where banks are <3 feet high, only map an unstable segment if it is ≥ 10 feet.⁴</p>	Bank Height	Minimum Length	>6	6	3-6	8	<3	10
Bank Height		Minimum Length											
>6		6											
3-6		8											
<3	10												
2. Undercut	In order to better assess continued bank erosion risk, tallied bank segments are also characterized with respect to the proximity and integrated extent of stabilizing vegetation. Continued erosion risk for a given bank instability object is essentially adjusted downwards by adjacent mature vegetation and/or stabilizing roots. One or more mature trees in close proximity (e.g. 10 feet or less) or obvious integration of root mass within the bank failure are characteristics that would prompt the tallying of a given bank object into the additional sub-category related to risk of further instability (columns J-L of the actual data table). Essentially, the vegetative elements of rooting density and depth (e.g. from a BEHI assessment) need to be considered here.	Banks undercut/overhanging to the extent that mass wasting appears likely? Does NOT include undercuts that modestly appear sustainable/stable and are providing habitat.		Orange.									
3. Mass Wasting	Bank slumping/calving/collapse?			Red.									
3. Structures	1. Overall Integrity	The assessment of engineered structure performance should include all structures that provide grade control, bank protection, or habitat functions. These include Vanes, J-hooks, and rootwads, etc.	Bulk of structure physically intact with no dislodged boulders or logs?		Using callouts or some other means to maintain legibility, annotate structure with red "S" if structural failure has occurred								
	2. Grade Control		Bed grade control maintained across the sill structure? No evident loss of bed elevation immediately upstream of structure? Some piping alone will not constitute a loss of grade control.		Using callouts or some other means to maintain legibility, annotate structure with red "G" if structure has lost grade control								
	2a. Piping		Catalog structures lacking any substantial flow underneath sills or around arms?		Using callouts or some other means to maintain legibility, annotate structure with red "P" if significant piping has occurred								
	3. Bank Protection		See exhibit 4 below for determining structural sphere of influence. If the amount of bank that is deemed to be actively eroding within the structures sphere of influence exceeds 15% of the total bank footage within the structures sphere of influence, then the structure should be classified as not providing adequate bank protection in the data table.		Using callouts or some other means to maintain legibility, annotate structure with red "B" if structure has failed to provide bank protection								
	4. Habitat		Are pools maintained @ ~ Max Pool Depth : Mean Bankfull Depth > 1.6? For rootwads, habitat provision means interacting with baseflow and providing cover.		Using callouts or some other means to maintain legibility, annotate structure with red "H" if structure is not providing habitat								

Exhibit 1. Examples of bar features warranting concern related to cataloging item 1.1.1 of the assessment



Exhibit 2. Graphic depicting embedding of riffles with fine material



Progressing from top to bottom, the series of graphics to the left depicts the filling of interstitial spaces between coarser particles. This describes increasing levels of embeddedness in riffles. The observer must have an understanding of the intended substrate distributions/texture of the bed for the projects riffles when assessing this. However, as a guideline for streams in the coarse gravel to cobble range, the 2nd panel from the top represents a visual guideline for the condition that would begin to elicit concern for this parameter, but still contains a good deal of coarse material. Progressing from that state to the conditions depicted in the 3rd and 4th panel represents a visual cue for significant embedding.

From USEPA (EPA 841-B-97-003 - Nov 1997)

Exhibit 3. Residual Pool Depth Table - Relating 1.6 criterion for typical mean riffle depths to residual pool depths

This residual pool table was provided in the event the tracking of bankfull at each pool feature to estimate a Dmax was inconvenient. Estimating the residual pool depth by measuring the max pool depth to water surface and subtracting the water depth at the riffle head may provide a more convenient way under certain circumstances to estimate in the field. For this reason the exhibit table provides a relationship between the 1.6 criterion applied to mean riffle depth for the site and the resulting residual pool depths.

Mean Riffle Depth D _{akt}	Multiplier	Target Bankfull Pool Max	Residual Pool Depth
1.0	1.6	1.6	0.6
1.5	1.6	2.4	0.9
2.0	1.6	3.2	1.2
2.5	1.6	4.0	1.5
3.0	1.6	4.8	1.8
3.5	1.6	5.6	2.1
4.0	1.6	6.4	2.4
4.5	1.6	7.2	2.7
5.0	1.6	8.0	3.0

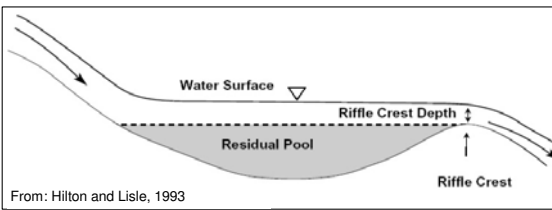
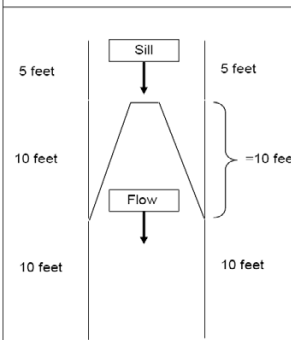


Exhibit 4. Extent of Structural Influence for Bank Protection



The drawing is a guideline for the extent of influence vane arms exert on stream banks. The bracketed segment (10ft) immediately adjacent to the vane arm is multiplied by 5 to determine the total length of bank influenced by a cross vane. This includes the bank length adjacent to each vane arm, 1 length (10 feet) below each van arm, and 1/2 length (5 feet) on each bank above the uppermost structural element (in this case the vane sill), yielding 50 feet in this example case. In this example a single arm vane or j-hook would only influence 25ft of bank.

If the amount of recent bank erosion observed within the extent of influence exceeds 15% then the structure is deemed not to be providing adequate bank protection. In the above examples this would amount to ~ 8 and 4 feet, respectively.

If in an earlier assessment the structure failed the 15% bank protection criteria but the erosion has subsequently stabilized, then the observer can use best professional judgment to determine if the structure is currently meeting the bank protection criteria.

5 = The above was developed because of the need to have a threshold given the large number of performers and to avoid spending time trying to catalog and map small objects that if excluded would have minimal overall impacts on the performance percentages. It is a guide that tries to strike a balance between the obvious need to have a threshold, yet provide confidence that the site conditions are accurately represented. For example, a scenario where 1 object nearly exceeding the threshold were to occur every 100 feet of bank height (which would be a high frequency and unlikely) with a bank height of 5 feet, would yield an error of ~3%. However, if the observer is encountering a truly high number of objects just below the threshold in the above table (e.g. > 1 per 100 feet of bank channel on average) and is concerned that the exclusion of such objects is going to misrepresent the site conditions, then judgement should be applied and objects below the threshold may be cataloged. If a rare condition as described does occur and the thresholds are not utilized then a table footnote explaining this should be included.

Lastly, given the increase in overall area and the implications to stability, greater banks heights required smaller threshold minimums.

Table 6 **Vegetation Condition Assessment**

Planted Acreage¹ **41**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	0.1 acres	Brown Hatch	3	0.55	1.3%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.01 acres	Brown Hatch	15	12.34	30.1%
Total				18	12.89	31.4%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	Brown Hatch	0	0.00	0.0%
Cumulative Total				18	12.89	31.4%

Easement Acreage² **51.83**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern ⁴	Areas or points (if too small to render as polygons at map scale).	500 SF	Brown Hatch	7	0.83	1.6%
5. Easement Encroachment Areas ³	Areas or points (if too small to render as polygons at map scale).	none	Brown Hatch	0	0.00	0.0%

¹ = Enter the planted acreage within the easement. This number is calculated as the easement acreage minus any existing mature tree stands that were not subject to supplemental planting of the understory, the channel acreage, crossings or any other elements not directly planted as part of the project effort.

² = The acreage within the easement boundaries.

³ = Encroachment may occur within or outside of planted areas and will therefore be calculated against the overall easement acreage. In the event a polygon is cataloged into items 1, 2 or 3 in the table and is the result of encroachment, the associated acreage should be tallied in the relevant item (i.e., item 1,2 or 3) as well as a parallel tally in item 5.

⁴ = Invasives may occur in or out of planted areas, but still within the easement and will therefore be calculated against the overall easement acreage. Invasives of concern/interest are listed below. The list of high concern species are those with the potential to directly outcompete native, young, woody stems in the short-term (e.g. monitoring period or shortly thereafter) or affect the community structure for existing, more established tree/shrub stands over timeframes that are slightly longer (e.g. 1-2 decades). The low/moderate concern group are those species that generally do not have this capacity over the timeframes discussed and therefore are not expected to be mapped with regularity, but can be mapped, if in the judgement of the observer their coverage, density or distribution is suppressing the viability, density, or growth of planted woody stems. Decisions as to whether remediation will be needed are based on the integration of risk factors by EEP such as species present, their coverage, distribution relative to native biomass, and the practicality of treatment. For example, even modest amounts of Kudzu or Japanese Knotweed early in the projects history will warrant control, but potentially large coverages of Microstegium in the herb layer will not likely trigger control because of the limited capacities to impact tree/shrub layers within the timeframes discussed and the potential impacts of treating extensive amounts of ground cover. Those species with the "watch list" designator in gray shade are of interest as well, but have yet to be observed across the state with any frequency. Those in *red italics* are of particular interest given their extreme risk/threat level for mapping as points where isolated specimens are found, particularly early in a projects monitoring history. However, areas of discreet, dense patches will of course be mapped as polygons. The symbology scheme below was one that was found to be helpful for symbolizing invasives polygons, particularly for situations where the condition for an area is somewhere between isolated specimens and dense, discreet patches. In any case, the point or polygon/area feature can be symbolized to describe things like high or low concern and species can be listed as a map inset, in legend items if the number of species are limited or in the narrative section of the executive summary.

High Concern:			Low/Moderate Concern:		
Vines	Genus/Species	Shrubs/Herbs	Genus/Species	Shrubs/Herbs	Genus/Species
<i>Kudzu</i>	<i>Pueraria lobata</i>	Japanese Knotweed	<i>Polygonum cuspidatum</i>	Japanese Privet	<i>Ligustrum Japonicum</i>
<i>Porcelain Berry</i>	<i>Ampelopsis brevipedunculata</i>	Oriental Bittersweet	<i>Celastrus orbiculatus</i>	Glossy Privet	<i>Ligustrum lucidum</i>
<i>Japanese Honeysuckle</i>	<i>Lonicera japonica</i>	Multiflora Rose	<i>Rosa multiflora</i>	Fescue	<i>Festuca</i> spp.
<i>Japanese Hops</i>	<i>Humulus japonicus</i>	Russian olive	<i>Elaeagnus angustifolia</i>	English Ivy	<i>Hedera helix</i>
Wisterias	<i>Wisteria</i> spp.	Chinese Privet	<i>Ligustrum sinense</i>	Microstegium	<i>Microstegium vimineum</i>
Winter Creeper	<i>Euonymus fortunei</i>	Chinese Silvergrass	<i>Miscanthus sinensis</i>	Burning Bush	<i>Euonymus alatus</i>
Bush Killer (Watch List)	<i>Cayratia japonica</i>	Phragmites	<i>Phragmites australis</i>	Johnson Grass	<i>Sorghum halepense</i>
		Bamboos	<i>Phyllostachys</i> spp	Bush Honeysuckles	<i>Lonicera</i> , spp.
Trees		<i>Sericea Lespedeza</i>	<i>Sericea Lespedeza</i>	Periwinkles	<i>Vinca minor</i>
<i>Tree of Heaven</i>	<i>Ailanthus altissima</i>	Garlic Mustard (Watch List)	<i>Alliaria petiolata</i>	Morning Glories	Morning Glories
Mimosa	<i>Albizia julibrissin</i>	Cogon Grass (Watch List)	<i>Imperata cylindrica</i>	Bicolor Lespedeza (Watch List)	<i>Lespedeza bicolor</i>
Princess Tree	<i>Paulownia tomentosa</i>	Giant Reed (Watch List)	<i>Arundo donax</i>	Chinese Yams (Watch List)	<i>Dioscorea oppositifolia</i>
China Berry	<i>Melia azedarach</i>	Tropical Soda Apple (Watch List)	<i>Solanum viarum</i>	Air Potato (Watch List)	<i>Dioscorea bulbifera</i>
Callery Pear	<i>Pyrus calleryana</i>	Japanese Spirea (Watch List)	<i>Spiraea japonica</i>	Japanese Climbing Fern (Watch List)	<i>Lygodium japonicum</i>
White Mulberry	<i>Morus alba</i>	Japanese Barberry (Watch List)	<i>Berberis thunbergii</i>		
Tallow Tree (Watch List)	<i>Triadica sebifera</i>				

Stream Station Photos



Photo 1. Looking downstream at XS-1



Photo 2. Looking downstream at XS-2



Photo 3. Looking downstream at XS-3



Photo 4. Looking downstream at XS-4



Photo 5. Looking downstream at XS-5



Photo 6. Looking downstream at XS-6



Photo 7. Looking downstream at XS-7



Photo 8. Looking downstream at XS-8



Photo 9. Looking downstream at XS-9



Photo 10. Looking downstream at XS-10

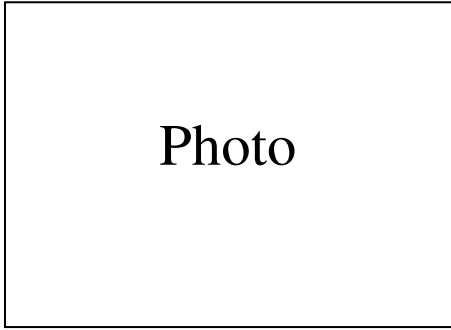


Photo 11. Looking downstream at XS-11



Photo 12. Looking downstream at XS-12

**Vegetation Monitoring Plots MY-03
September 6, 2011**



Veg Plot 1



Veg Plot 2



Veg Plot 3



Veg Plot 4

**Vegetation Monitoring Plots MY-04
September 5, 2012**



Veg Plot 1



Veg Plot 2



Veg Plot 3



Veg Plot 4



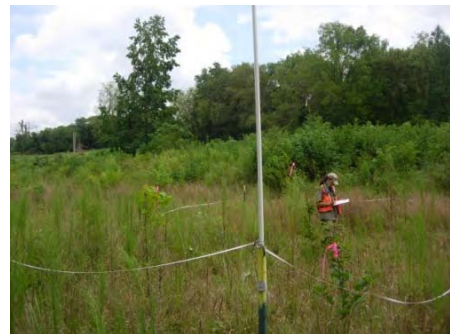
Veg Plot 5



Veg Plot 5



Veg Plot 6



Veg Plot 6



Veg Plot 7



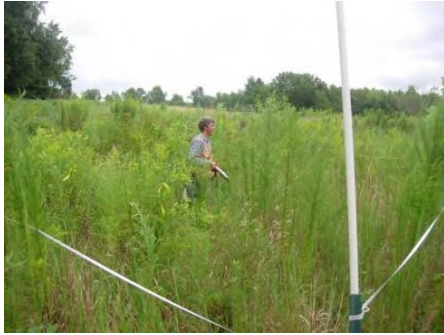
Veg Plot 7



Veg Plot 8



Veg Plot 8



Veg Plot 9



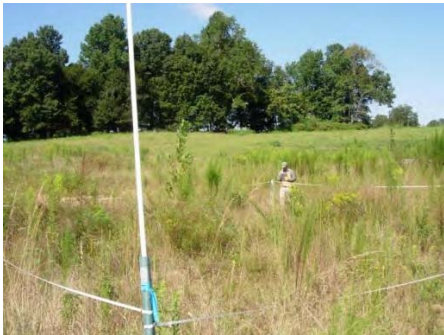
Veg Plot 9



Veg Plot 10



Veg Plot 10



Veg Plot 11



Veg Plot 11



Veg Plot 12



Veg Plot 12



Veg Plot 13



Veg Plot 13



Veg Plot 14



Veg Plot 14



Veg Plot 15



Veg Plot 15

Appendix C. Vegetation Plot Data

Table 7. Vegetation Plot Criteria Attainment			
Vegetation Plot ID	Vegetation Survival Threshold Met? (288 planted stems/acre)	Monitoring Year 04 Planted Stem Density stems/acre	Monitoring Year - 04 Total Stem Density stems/acre
VP1	Yes	323	1497
VP2	Yes	566	971
VP3	Yes	647	7972
VP4	No	242	1133
VP5	Yes	688	2590
VP6	Yes	323	3723
VP7	Yes	566	5989
VP8	Yes	485	3561
VP9	Yes	526	5463
VP10	No	283	4411
VP11	Yes	323	1376
VP12	No	283	3804
VP13	Yes	728	13193
VP14	Yes	485	91985
VP15	Yes	607	33548

Table 8. CVS Metadata

Report Prepared By The Catena Group
 Date Prepared 11/10/2012 0:00

database name Upper UT to Cane Creek (Pickard).mdb
 database location F:
 computer name
 file size

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.
ALL Stems by Plot and spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.

PROJECT SUMMARY-----

Project Code	395
project Name	Upper UT to Cane Creek (Picard)
Description	UT to Cane Creek Stream and Wetland Enhancement
River Basin	Cape Fear
length(ft)	6782.59
stream-to-edge width (ft)	
area (acres)	51.83
Required Plots (calculated)	
Sampled Plots	15

Appendix D. Stream Survey Data

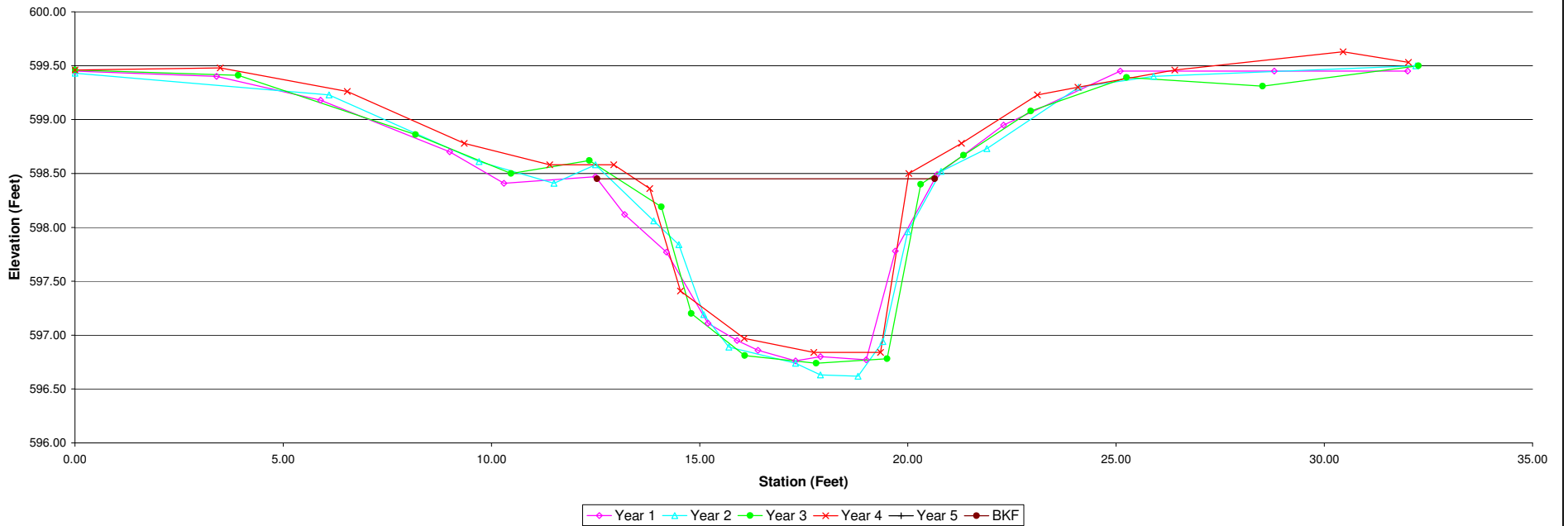
Project:	UT to Cane Creek (Pickard)	Summary (bankfull)					
Cross Section:	Cross Section 1		MY1	MY2	MY3	MY4	MY5
Feature:	Pool	A (BKF)	9.0	8.8	9.4	8.2	
Station:	13+77 (Reach 1)	W (BKF)	8.1	7.8	7.5	6.6	
Date:	3/13/12	Max d	1.7	1.8	1.7	1.6	
Crew:	SV, ZP	Mean d	1.1	1.1	1.3	1.2	
		W/D	N/A	N/A	5.9	5.2	

MY01-2009			MY02-2010			MY03-2011			MY04-2012		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
0.00	599.45		0.00	599.43		0.00	599.46	LPIN	0.00	599.46	LPIN
3.40	599.40		6.10	599.23		3.92	599.41		3.49	599.48	
5.90	599.18		9.70	598.61		8.18	598.86		6.54	599.26	
9.00	598.70		11.50	598.41	3L Bankfull	10.47	598.50		9.35	598.78	
10.30	598.41	3L Bankfull	12.50	598.58		12.35	598.62	BANKFULL	11.40	598.58	
12.50	598.47		13.90	598.06		14.08	598.19		12.94	598.58	3L Bankfull
13.20	598.12		14.50	597.84		14.80	597.20	TOE L	13.80	598.36	
14.20	597.77		15.10	597.19		16.08	596.81		14.54	597.41	TOE L
15.20	597.11		15.70	596.89	TOE L	17.80	596.74	TW	16.07	596.97	
15.90	596.95		17.30	596.74		19.50	596.78	TOE R	17.74	596.84	TW
16.40	596.86		17.90	596.63		20.31	598.40		19.34	596.84	TOE R
17.30	596.76	TW	18.80	596.62	TW	21.34	598.67		20.02	598.50	
17.90	596.80		19.40	596.94	TOE R	22.95	599.08	TOBR	21.29	598.78	
19.00	596.77		20.00	597.96		25.25	599.39		23.11	599.23	
19.70	597.78		20.80	598.52	R Bankfull	28.52	599.31		24.08	599.30	R Bankfull
20.70	598.49	IR Bankfull	21.90	598.73		32.26	599.50	RPIN	26.41	599.46	
22.30	598.95		24.10	599.30					30.45	599.63	
25.10	599.45		25.90	599.40					32.02	599.53	RPIN
28.80	599.45		32.20	599.50							
32.00	599.45										



Photo of XS-1, looking in the downstream direction

Cross Section 1



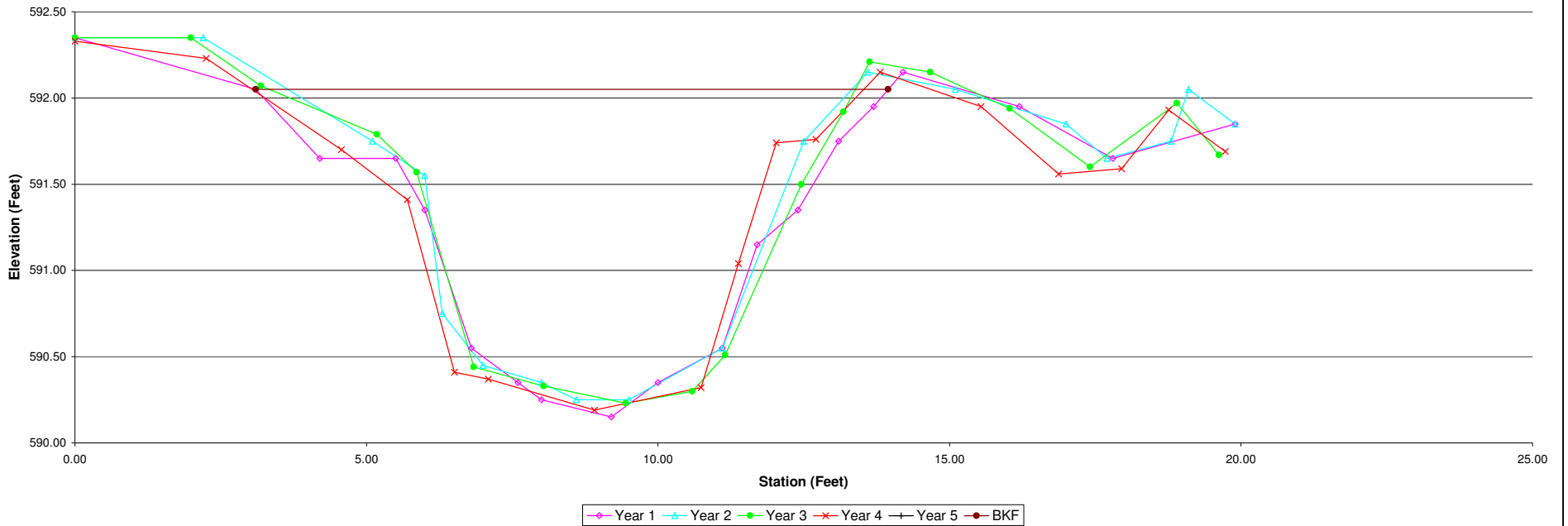
Project:	UT to Cane Creek (Pickard)	Summary (bankfull)						
Cross Section:	Cross Section 5		MY1	MY2	MY3	MY4	MY5	
Feature:	Pool	A (BKF)	11.1	11.1	10.7	10.9		
Station:	23+71	W (BKF)	10.8	10.4	10.0	10.5		
Date:	3/13/12	Max d	1.9	1.9	1.8	1.9		
Crew:	SV, ZP	Mean d	1.0	1.1	1.1	1.0		
		W/D	N/A	N/A	9.4	10.1		



Photo of XS-5, looking in the downstream direction

MY01-2009			MY02-2010			MY03-2011			MY04-2012		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
0.00	592.35		0.00	592.35		0.00	592.35	LPIN	0.00	592.33	LPIN
3.10	592.05	3L Bankfull	2.20	592.35	3L Bankfull	1.99	592.35	BANKFULL	2.25	592.23	3L Bankfull
4.20	591.65		5.10	591.75		3.19	592.07		4.57	591.70	
5.50	591.65		6.00	591.55		5.18	591.79		5.70	591.41	
6.00	591.35		6.30	590.75		5.86	591.57		6.51	590.41	TOE L
6.80	590.55	TOE L	7.00	590.45	TOE L	6.84	590.44	TOE L	7.09	590.37	
7.60	590.35		8.00	590.35		8.04	590.33		8.91	590.19	TW
8.00	590.25		8.60	590.25		9.45	590.23	TW	10.74	590.32	TOE R
9.20	590.15	TW	9.50	590.25	TW	10.59	590.30		11.38	591.04	
10.00	590.35		11.10	590.55	TOE R	11.15	590.51	TOE R	12.03	591.74	
11.10	590.55	TOE R	12.50	591.75		12.46	591.50		12.71	591.76	
11.70	591.15		13.60	592.15	R Bankfull	13.18	591.92		13.81	592.15	R Bankfull
12.40	591.35		15.10	592.05		13.63	592.21	TOBR	15.54	591.95	
13.10	591.75		17.00	591.85		14.67	592.15		16.87	591.56	
13.70	591.95	R Bankfull	17.70	591.65		16.03	591.94		17.95	591.59	
14.20	592.15		18.80	591.75		17.41	591.60		18.76	591.93	
16.20	591.95		19.10	592.05		18.90	591.97		19.73	591.69	RPIN
17.80	591.65		19.90	591.85		19.62	591.67	RPIN			
19.90	591.85										

Cross Section 5



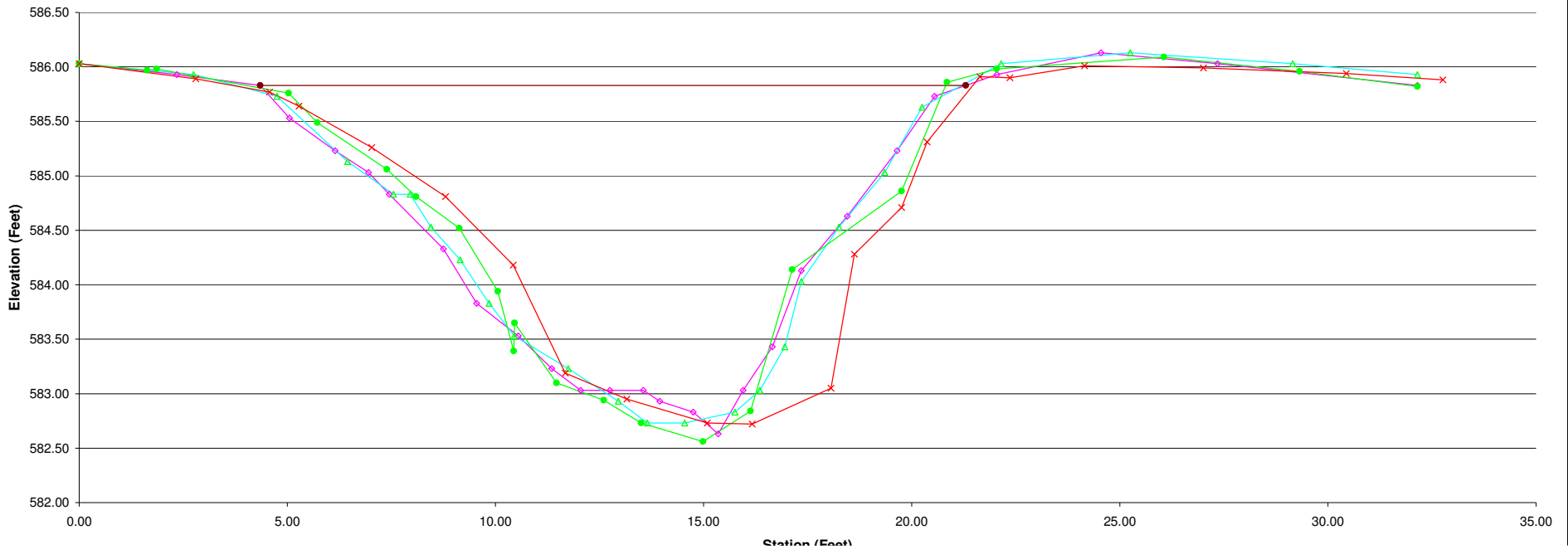
Project:	UT to Cane Creek (Pickard)	Summary (bankfull)						
Cross Section:	Cross Section 9		MY1	MY2	MY3	MY4	MY5	
Feature:	Pool	A (BKF)	28.4	28.5	28.4	29.4		
Station:	43+03 (Reach 4)	W (BKF)	16.8	17.7	16.8	17.8		
Date:	3/13/12	Max d	3.2	3.1	3.3	3.1		
Crew:	SV, ZP	Mean d	1.7	1.6	1.7	1.7		
		W/D	N/A	N/A	9.9	10.8		

MY01-2009			MY02-2010			MY03-2011			MY04-2012		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
0.00	586.03		0.00	586.03		0.00	586.03	LPIN	0.00	586.03	LPIN
2.35	585.93		2.75	585.93		1.63	585.97		2.80	585.89	
4.35	585.83		4.75	585.73	3L Bankfull	1.86	585.98		4.57	585.77	3L Bankfull
5.05	585.53		6.45	585.13		5.03	585.76		5.28	585.64	
6.15	585.23	3L Bankfull	7.55	584.83		5.72	585.49	BANKFULL	7.03	585.26	
6.95	585.03		7.95	584.83		7.39	585.06		8.80	584.81	
7.45	584.83		8.45	584.53		8.09	584.81		10.43	584.18	
8.75	584.33		9.15	584.23		9.13	584.52		11.68	583.19	TOE L
9.55	583.83		9.85	583.83		10.06	583.94		13.16	582.95	
10.55	583.53		10.45	583.53	TOE L	10.44	583.39	TOE L	15.09	582.73	TW
11.35	583.23		11.75	583.23		10.46	583.65		16.17	582.72	
12.05	583.03	TOE L	12.95	582.93		11.47	583.10		18.06	583.05	TOE R
12.75	583.03		13.65	582.73	TW	12.60	582.94		18.62	584.28	
13.55	583.03		14.55	582.73		13.50	582.73	TW	19.76	584.71	
13.95	582.93		15.75	582.83		14.99	582.56		20.37	585.31	
14.75	582.83		16.35	583.03	TOE R	16.13	582.84	TOE R	21.64	585.91	R Bankfull
15.35	582.63	TW	16.95	583.43		17.13	584.14		22.36	585.90	
15.95	583.03		17.35	584.03		19.76	584.86		24.15	586.01	
16.65	583.43		18.25	584.53		20.85	585.86	TOBR	27.01	585.99	
17.35	584.13		19.35	585.03		22.04	585.98		30.44	585.94	
18.45	584.63		20.25	585.63	R Bankfull	26.06	586.09		32.76	585.88	RPIN
19.65	585.23	R Bankfull	22.15	586.03		29.32	585.96				
20.55	585.73		25.25	586.13		32.15	585.82	RPIN			
22.05	585.93		29.15	586.03							
24.55	586.13		32.15	585.93							
27.35	586.03										
32.15	585.83										



Photo of XS-9, looking in the downstream direction

Cross Section 9



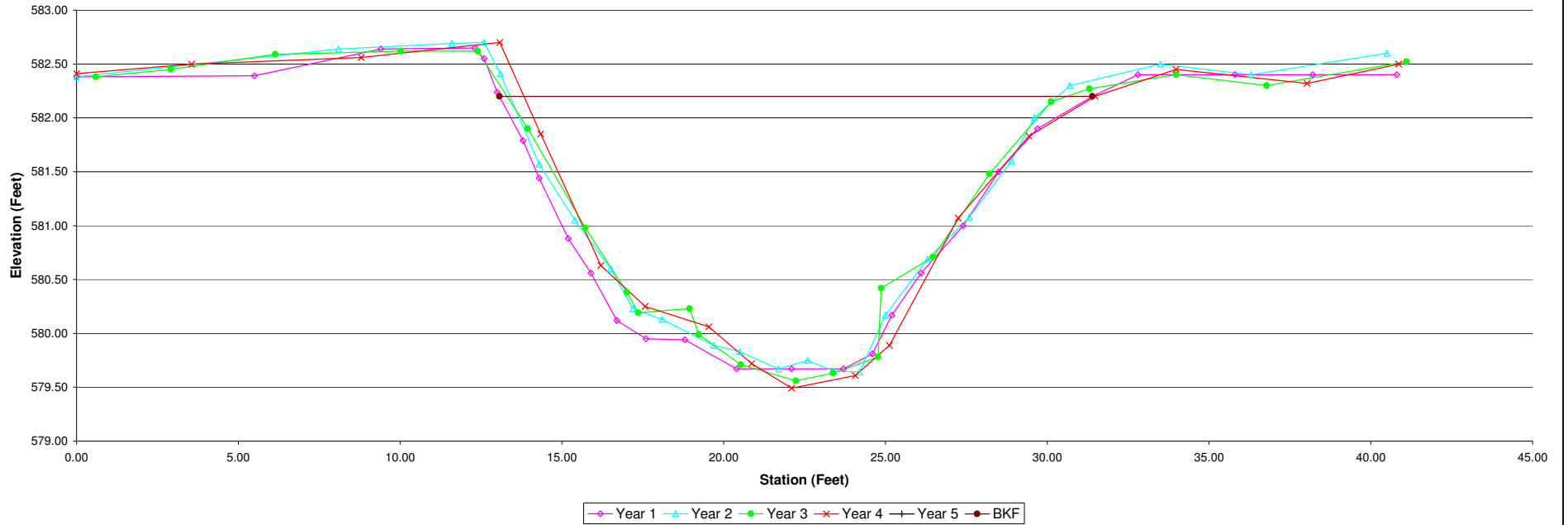
Project:	UT to Cane Creek (Pickard)	Summary (bankfull)						
Cross Section:	Cross Section 12		MY1	MY2	MY3	MY4	MY5	
Feature:	Riffle	A (BKF)	22.9	21.1	22.3	23.1		
Station:	56+11 Downstream of Reach 5	W (BKF)	14.5	12.4	15.5	15.6		
Date:	3/13/12	Max d	2.6	2.6	2.3	2.4		
Crew:	SV, ZP	Mean d	1.6	1.7	1.4	1.5		
		W/D	9.2	7.3	10.7	10.5		



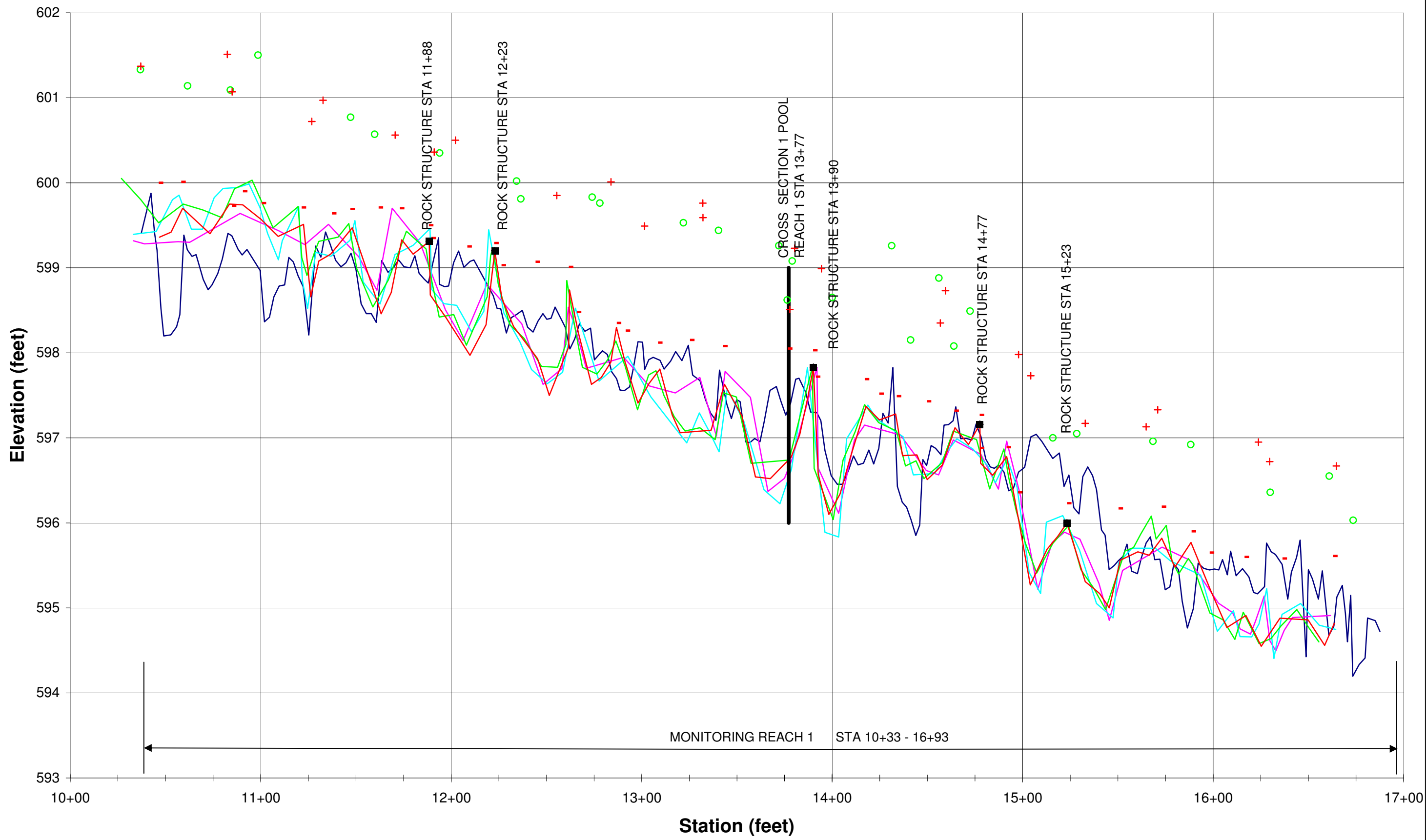
Photo of XS-12, looking in the downstream direction

MY01-2009			MY02-2010			MY03-2011			MY04-2012		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
0.00	582.38		0.00	582.38		0.60	582.38	LPIN	0.00	582.41	LPIN
5.50	582.39		8.10	582.64		2.92	582.45		3.55	582.50	
9.40	582.64		11.60	582.69		6.14	582.59		8.80	582.56	
12.30	582.65		12.60	582.70		10.02	582.62		13.08	582.70	TOBL
12.60	582.55		13.10	582.41	3L Bankfull	12.40	582.62	BANKFULL	14.35	581.85	Bankfull Left
13.00	582.24	3L Bankfull	14.30	581.57		13.95	581.90		16.20	580.63	
13.80	581.79		15.40	581.05		15.73	580.98		17.57	580.25	
14.30	581.44		16.50	580.60		17.01	580.38		19.54	580.06	
15.20	580.88		17.20	580.23	TOE L	17.36	580.19		20.87	579.72	
15.90	580.56		18.10	580.13		18.95	580.23		22.10	579.49	TW
16.70	580.12	TOE L	19.70	579.89		19.23	579.99		24.07	579.61	
17.60	579.95		20.50	579.83		20.53	579.71	TOE L	25.12	579.89	TOE R
18.80	579.94		21.70	579.67		22.23	579.56	TW	27.25	581.07	
20.40	579.67		22.60	579.75		23.38	579.63		29.44	581.83	
22.10	579.67	TW	23.40	579.65		24.77	579.78	TOE R	31.48	582.20	R Bankfull
23.70	579.67		24.20	579.64	TW	24.87	580.42		33.98	582.45	
24.60	579.81	TOE R	25.00	580.17		26.47	580.71		38.03	582.32	
25.20	580.17		26.30	580.69		28.21	581.48		40.87	582.50	RPIN
26.10	580.56		27.60	581.08		30.12	582.15	TOBR			
27.40	581.00		28.90	581.60		31.31	582.27				
28.50	581.50		29.60	582.00		33.99	582.40				
29.70	581.90		30.70	582.30	R Bankfull	36.78	582.30				
31.40	582.20	R Bankfull	33.50	582.50		41.10	582.52	RPIN			
32.80	582.40		36.30	582.40							
35.80	582.40		40.50	582.60							
38.20	582.40										
40.80	582.40										

Cross Section 12

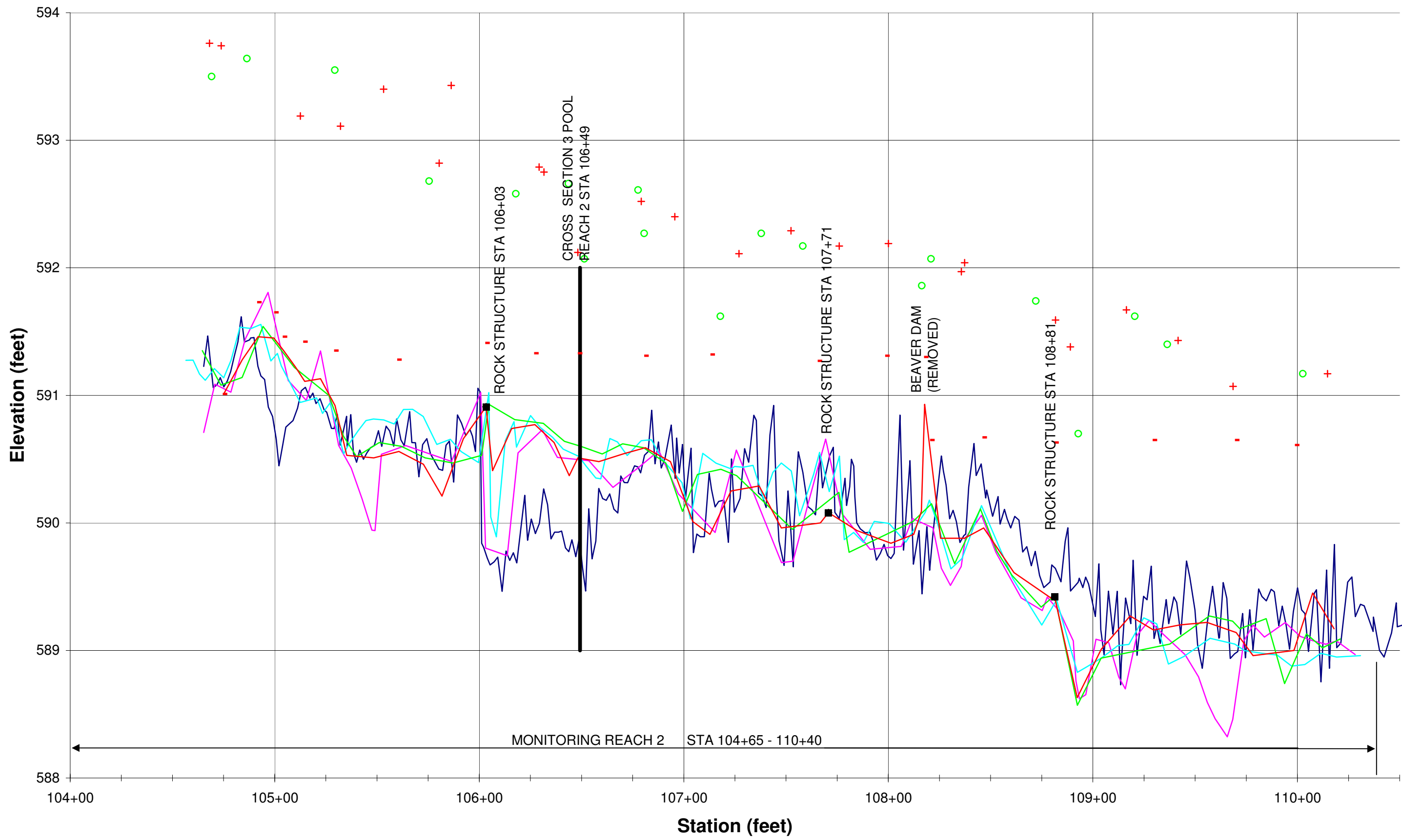


Upper UT to Cane Creek (Pickard)
 Longitudinal Profile
 Reach 1



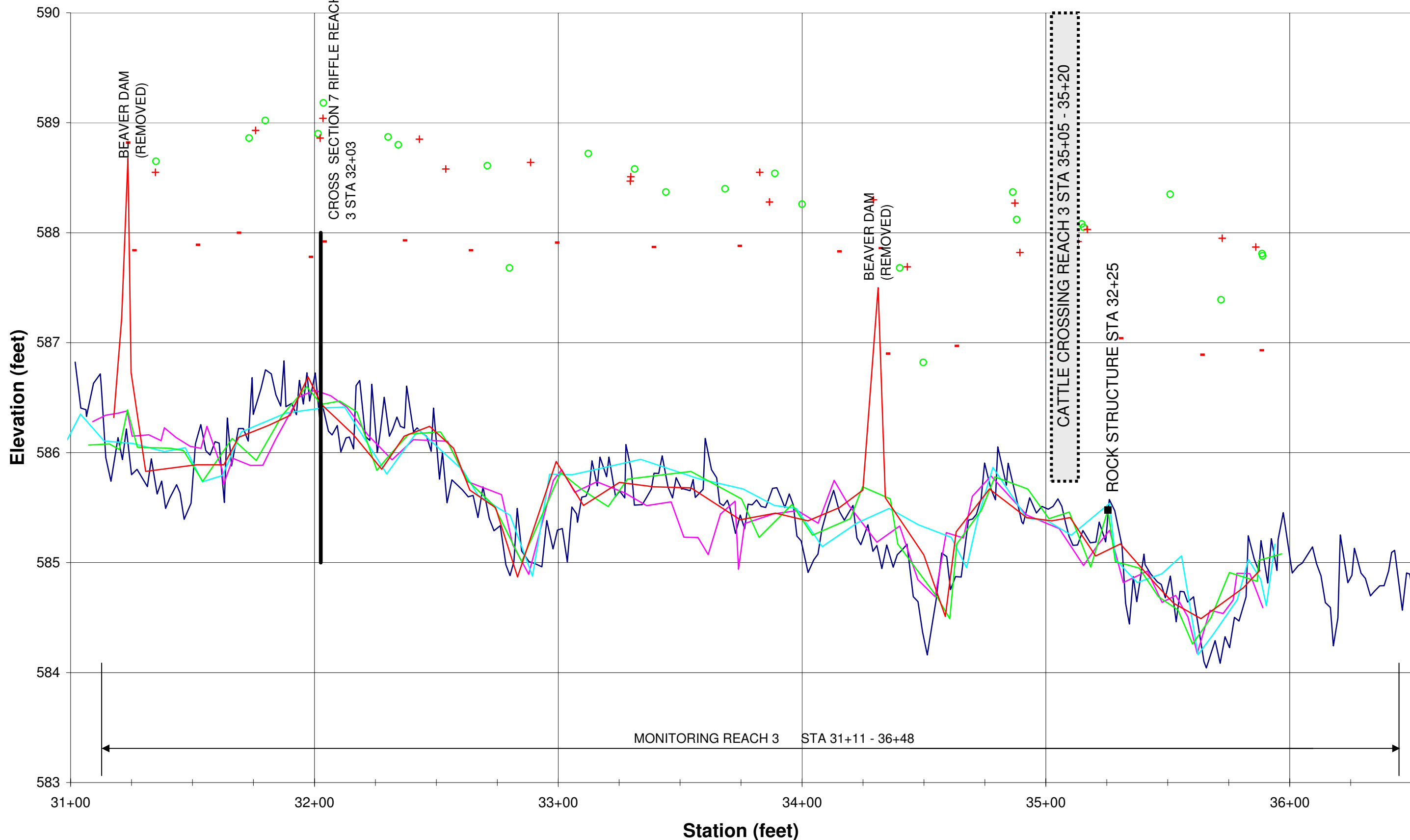
— TW MY-00 — TW MY-01 — TW MY-02 — TW MY-03 ○ BKF MY-03 — TW MY-04 - - WS MY-04 + BKF MY-04

Upper UT to Cane Creek (Pickard)
 Longitudinal Profile
 Reach 2



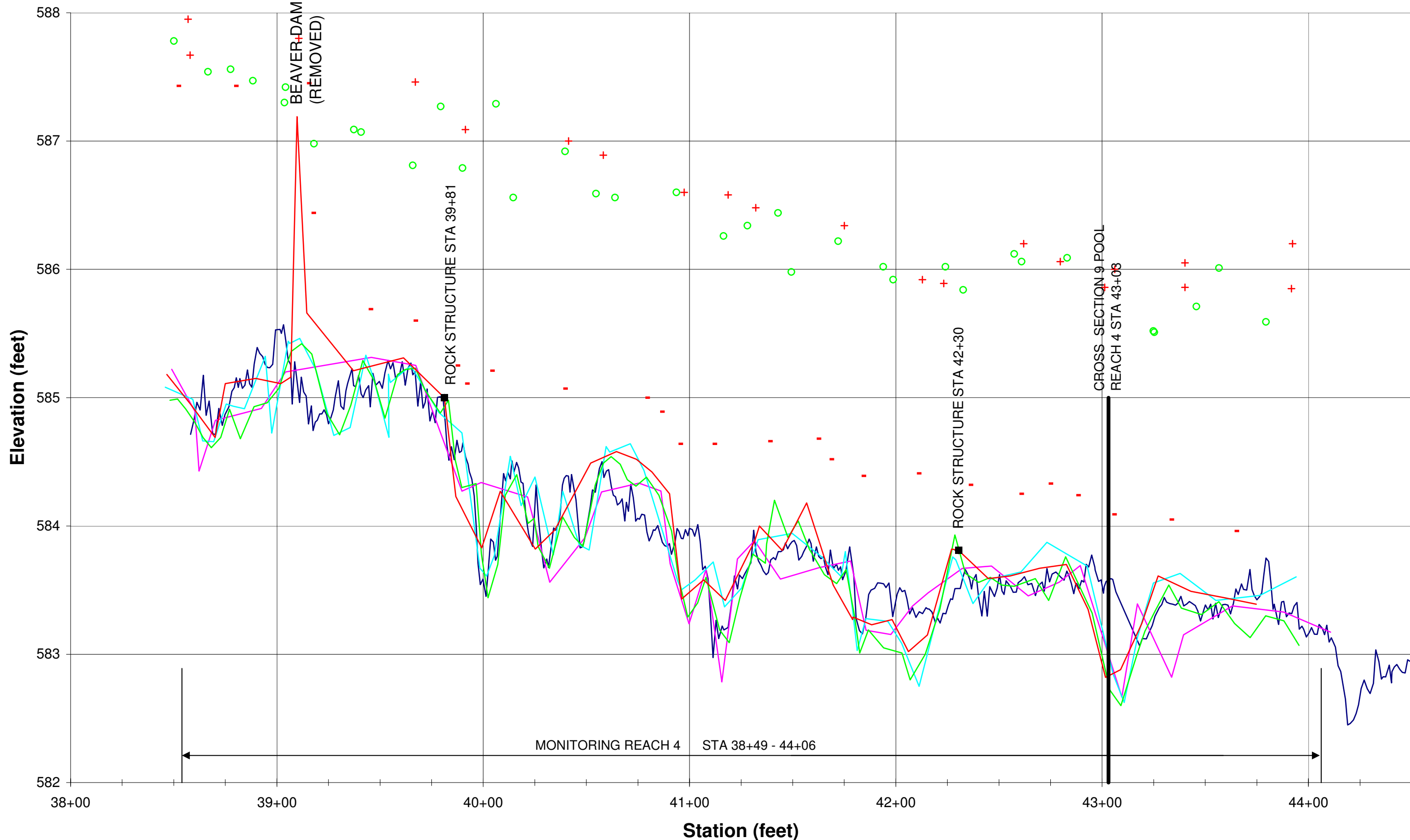
— TW MY-00 — TW MY-01 — TW MY-02 — TW MY-03 ○ BKF MY-03 — TW MY-04 - - WS MY-04 + BKF MY-04

Upper UT to Cane Creek (Pickard)
 Longitudinal Profile
 Reach 3



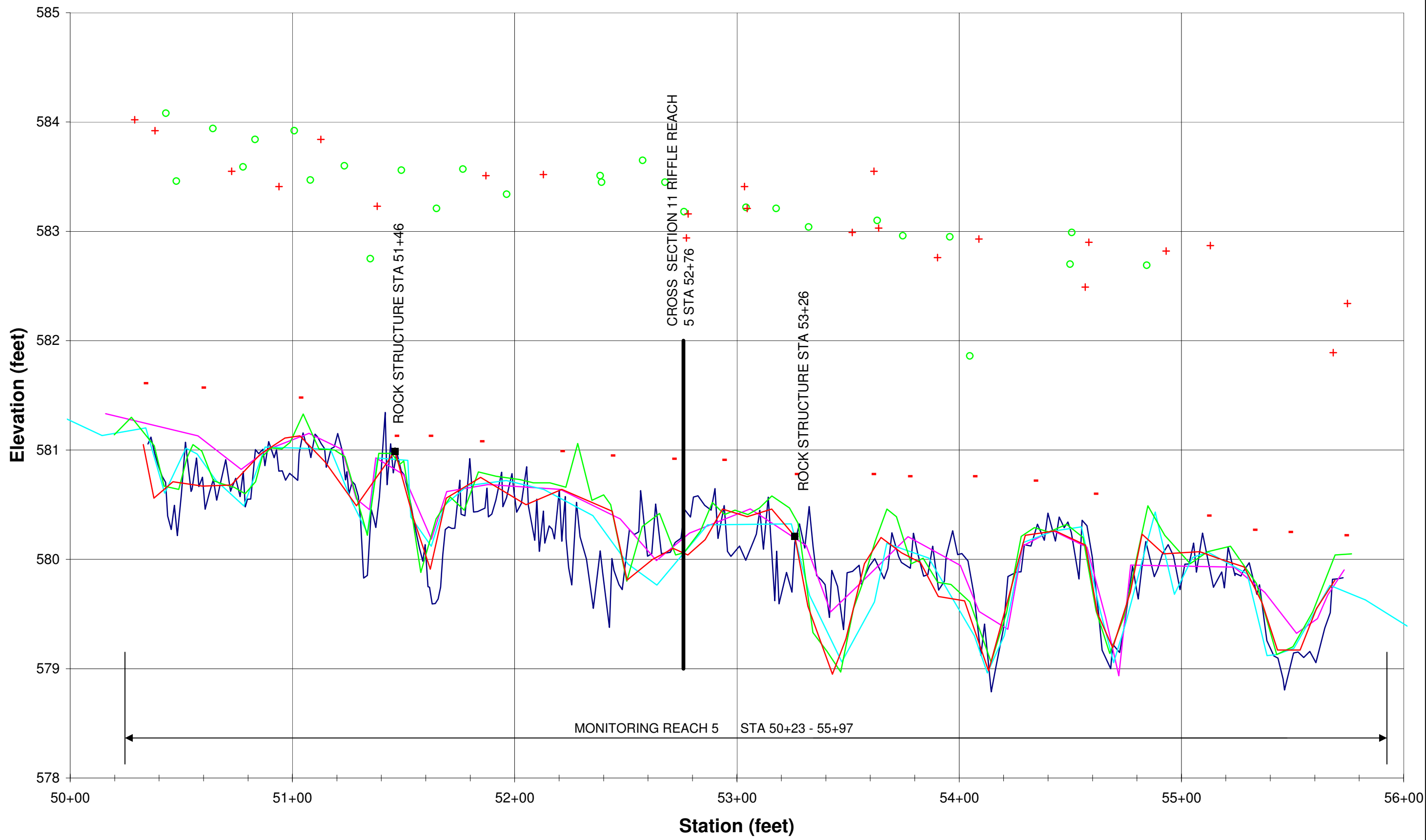
— TW MY-00 — TW MY-01 — TW MY-02 — TW MY-03 ○ BKF MY-03 — TW MY-04 — WS MY-04 + BKF MY-04

Upper UT to Cane Creek (Pickard)
 Longitudinal Profile
 Reach 4



— TW MY-00 — TW MY-01 — TW MY-02 — TW MY-03 ○ BKF MY-03 — TW MY-04 - WS MY-04 + BKF MY-04

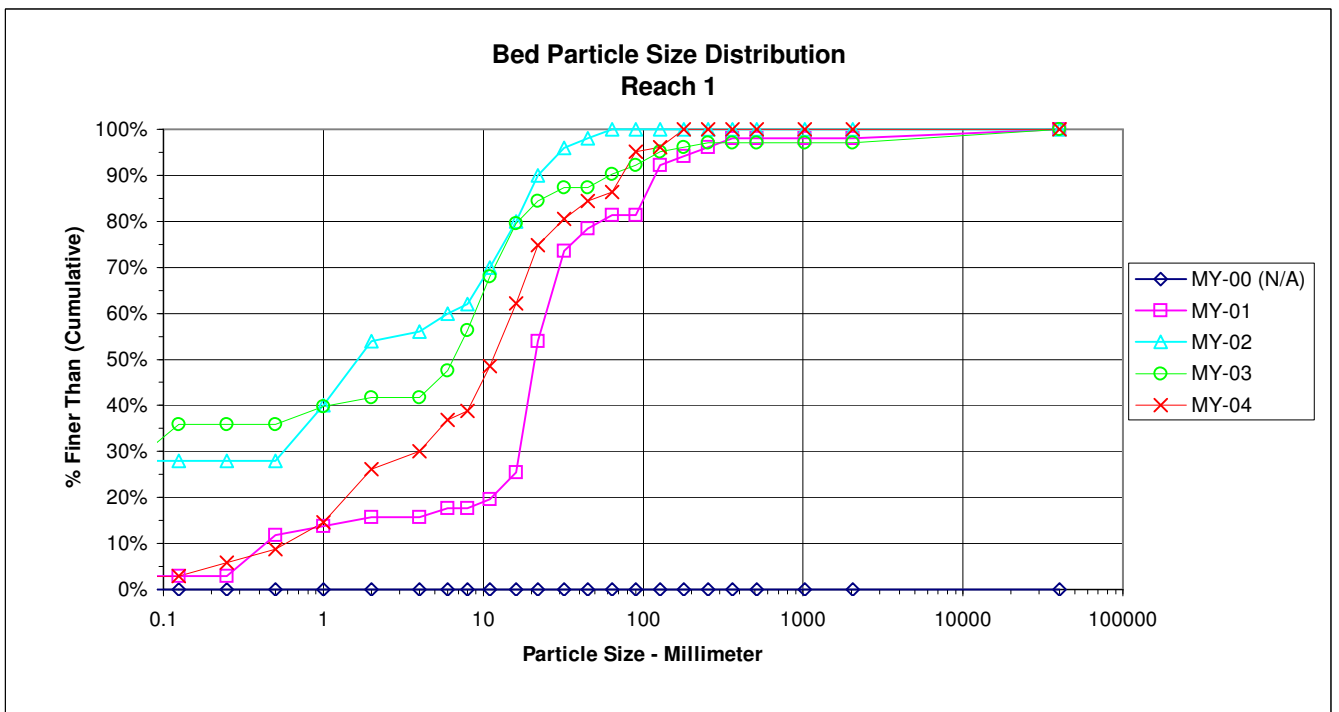
Upper UT to Cane Creek (Pickard)
 Longitudinal Profile
 Reach 5



— TW MY-00 — TW MY-01 — TW MY-02 — TW MY-03 ○ BKF MY-03 — TW MY-04 - - WS MY-04 + BKF MY-04

PEBBLE COUNT								
Project: Upper UT to Cane Creek (Pickard)					Date: 8/28/2012			
Location: Reach 1								
Particle Counts								
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C	3	0	3	3%	3%
.04 - .08	Very Fine	.062 - .125	S	0	0	0	0%	3%
	Fine	.125 - .25	A	3	0	3	3%	6%
	Medium	.25 - .50	N	2	1	3	3%	9%
	Coarse	.50 - 1.0	D	5	1	6	6%	15%
	Very Coarse	1.0 - 2.0	S	6	6	12	12%	26%
.08 - .16	Very Fine	2.0 - 4.0		0	4	4	4%	30%
.16 - .22	Fine	4.0 - 5.7	G	1	6	7	7%	37%
.22 - .31	Fine	5.7 - 8.0	R	1	1	2	2%	39%
.31 - .44	Medium	8.0 - 11.3	A	4	6	10	10%	49%
.44 - .63	Medium	11.3 - 16.0	V	6	8	14	14%	62%
.63 - .89	Coarse	16.0 - 22.6	E	9	4	13	13%	75%
.89 - 1.26	Coarse	22.6 - 32.0	L	3	3	6	6%	81%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S	1	3	4	4%	84%
1.77 - 2.5	Very Coarse	45.0 - 64.0		0	2	2	2%	86%
2.5 - 3.5	Small	64 - 90	C	6	3	9	9%	95%
3.5 - 5.0	Small	90 - 128	O	1	0	1	1%	96%
5.0 - 7.1	Large	128 - 180	B	2	2	4	4%	100%
7.1 - 10.1	Large	180 - 256	L	0	0	0	0%	100%
10.1 - 14.3	Small	256 - 362	B	0	0	0	0%	100%
14.3 - 20	Small	362 - 512	L	0	0	0	0%	100%
20 - 40	Medium	512 - 1024	D	0	0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R	0	0	0	0%	100%
	Bedrock		BDRK	0	0	0	0%	100%
Totals				53	50	103	100%	100%

d16	d35	d50	d84	d95
1.1	5.4	11.5	43.4	89.6



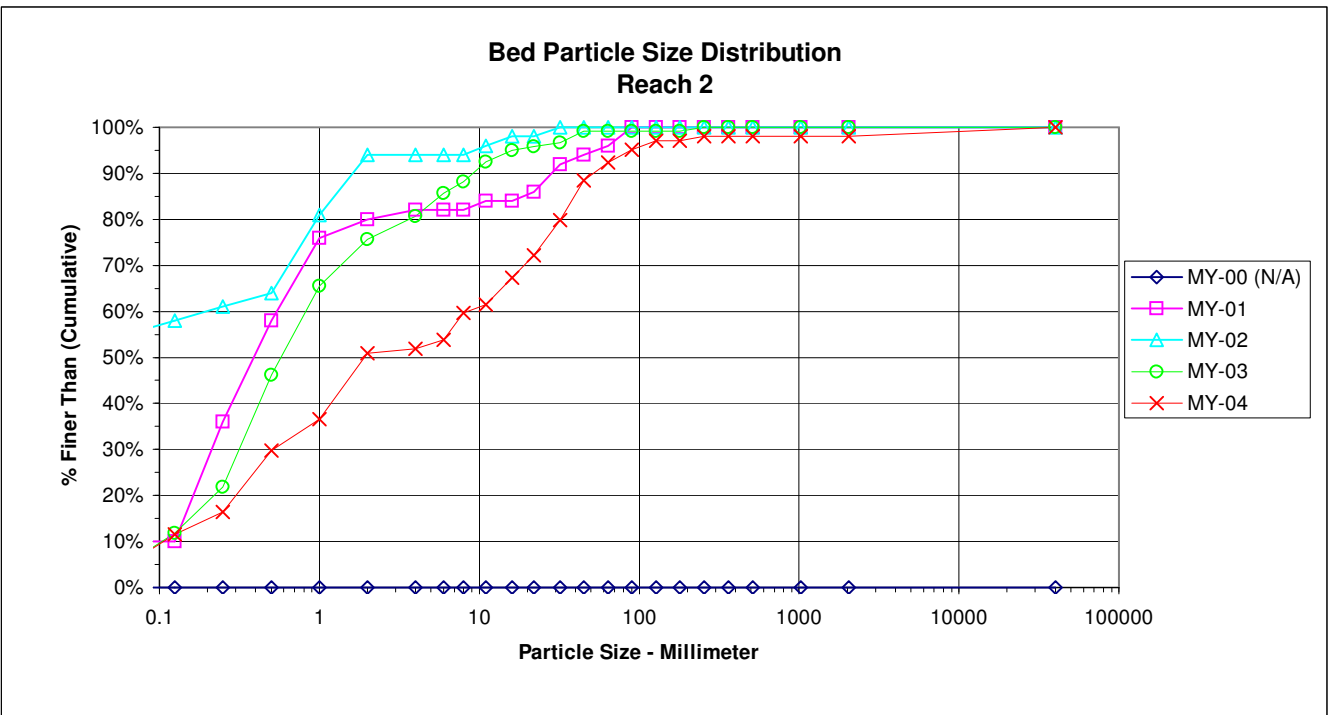
PEBBLE COUNT

Project: Upper UT to Cane Creek (Pickard) **Date:** 8/28/2012

Location: Reach 2

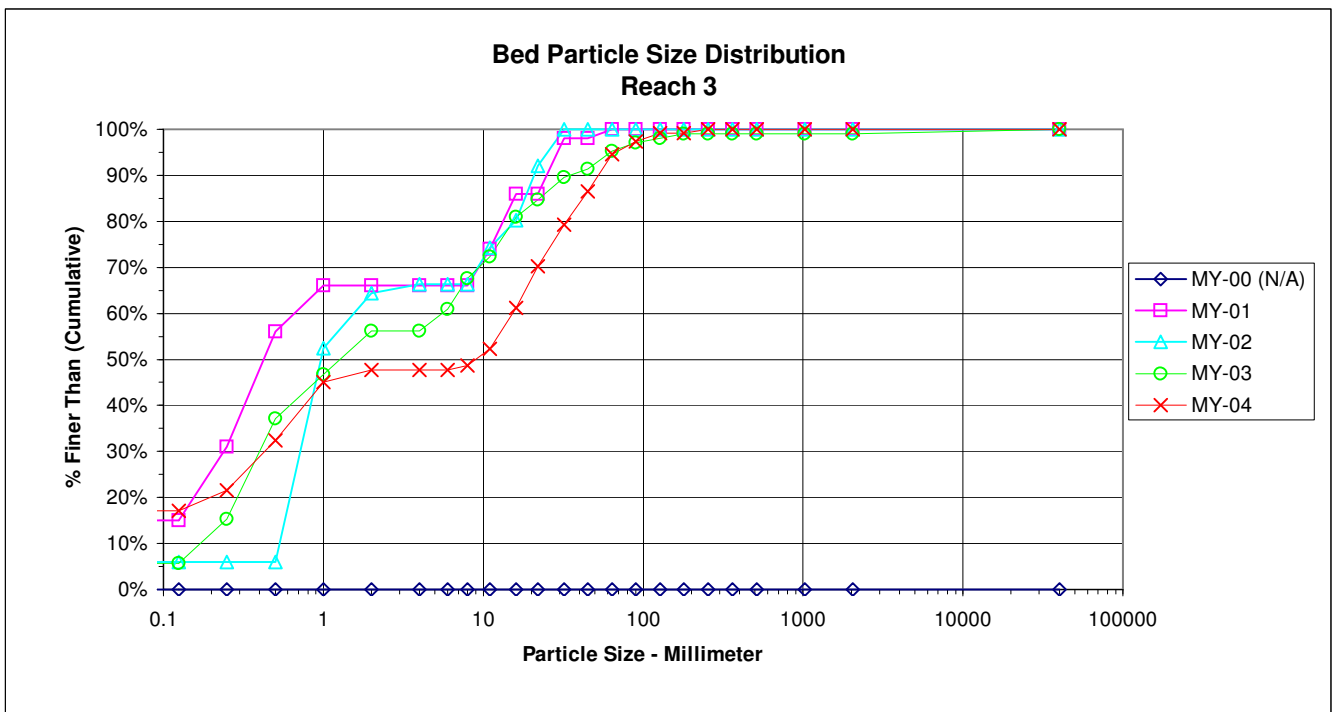
Particle Counts								
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C	0	5	5	5%	5%
.04 - .08	Very Fine	.062 - .125	S	2	5	7	7%	12%
	Fine	.125 - .25	A	0	5	5	5%	16%
	Medium	.25 - .50	N	8	6	14	13%	30%
	Coarse	.50 - 1.0	D	2	5	7	7%	37%
	Very Coarse	1.0 - 2.0	S	10	5	15	14%	51%
.08 - .16	Very Fine	2.0 - 4.0		1	0	1	1%	52%
.16 - .22	Fine	4.0 - 5.7	G	2	0	2	2%	54%
.22 - .31	Fine	5.7 - 8.0	R	4	2	6	6%	60%
.31 - .44	Medium	8.0 - 11.3	A	0	2	2	2%	62%
.44 - .63	Medium	11.3 - 16.0	V	5	1	6	6%	67%
.63 - .89	Coarse	16.0 - 22.6	E	2	3	5	5%	72%
.89 - 1.26	Coarse	22.6 - 32.0	L	5	3	8	8%	80%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S	6	3	9	9%	88%
1.77 - 2.5	Very Coarse	45.0 - 64.0		2	2	4	4%	92%
2.5 - 3.5	Small	64 - 90	C	0	3	3	3%	95%
3.5 - 5.0	Small	90 - 128	O	2	0	2	2%	97%
5.0 - 7.1	Large	128 - 180	B	0	0	0	0%	97%
7.1 - 10.1	Large	180 - 256	L	1	0	1	1%	98%
10.1 - 14.3	Small	256 - 362	B	0	0	0	0%	98%
14.3 - 20	Small	362 - 512	L	0	0	0	0%	98%
20 - 40	Medium	512 - 1024	D	0	0	0	0%	98%
40 - 80	Lrg- Very Lrg	1024 - 2048	R	0	0	0	0%	98%
	Bedrock		BDRK	2	0	2	2%	100%
Totals				54	50	104	100%	100%

d16	d35	d50	d84	d95
0.2	0.9	1.9	38.3	88.3



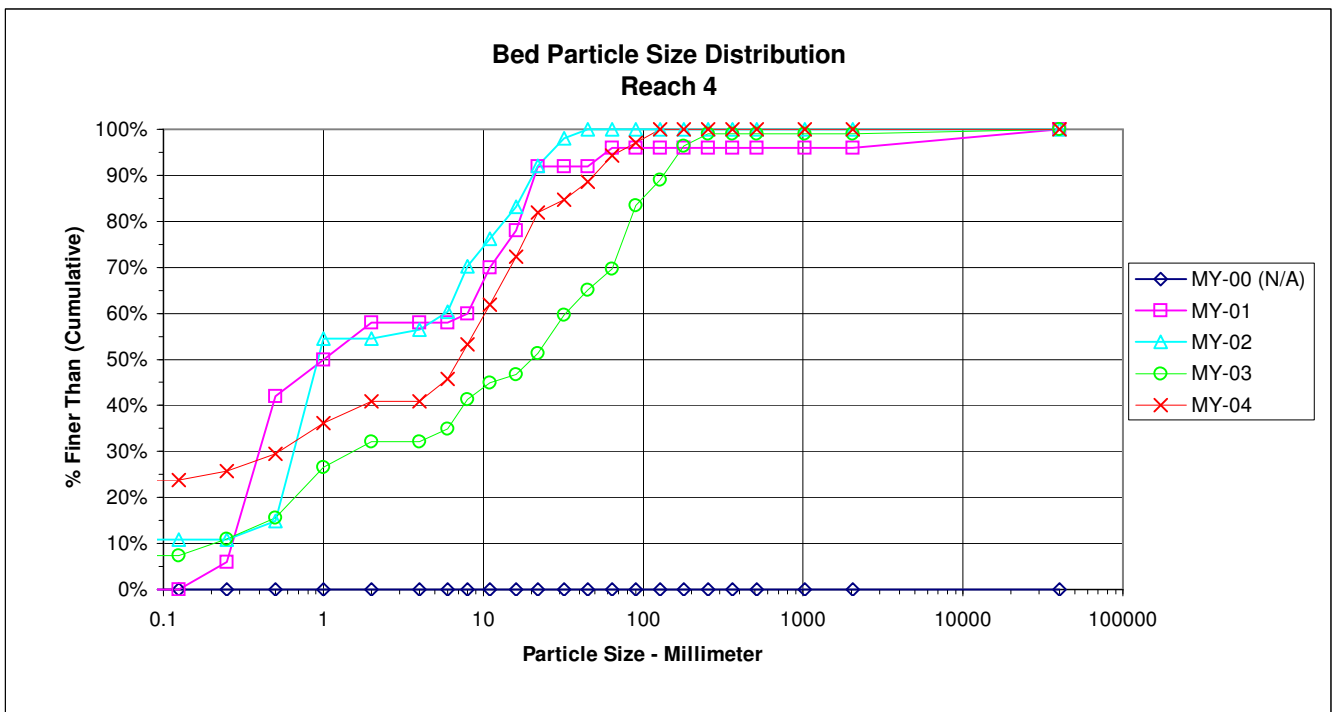
PEBBLE COUNT								
Project: Upper UT to Cane Creek (Pickard)						Date: 8/28/2012		
Location: Reach 3								
Particle Counts								
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C	11	8	19	17%	17%
.04 - .08	Very Fine	.062 - .125	S	0	0	0	0%	17%
	Fine	.125 - .25	A	4	1	5	5%	22%
	Medium	.25 - .50	N	3	9	12	11%	32%
	Coarse	.50 - 1.0	D	8	6	14	13%	45%
	Very Coarse	1.0 - 2.0	S	2	1	3	3%	48%
.08 - .16	Very Fine	2.0 - 4.0		0	0	0	0%	48%
.16 - .22	Fine	4.0 - 5.7	G	0	0	0	0%	48%
.22 - .31	Fine	5.7 - 8.0	R	0	1	1	1%	49%
.31 - .44	Medium	8.0 - 11.3	A	2	2	4	4%	52%
.44 - .63	Medium	11.3 - 16.0	V	3	7	10	9%	61%
.63 - .89	Coarse	16.0 - 22.6	E	3	7	10	9%	70%
.89 - 1.26	Coarse	22.6 - 32.0	L	5	5	10	9%	79%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S	4	4	8	7%	86%
1.77 - 2.5	Very Coarse	45.0 - 64.0		5	4	9	8%	95%
2.5 - 3.5	Small	64 - 90	C	1	2	3	3%	97%
3.5 - 5.0	Small	90 - 128	O	1	1	2	2%	99%
5.0 - 7.1	Large	128 - 180	B	0	0	0	0%	99%
7.1 - 10.1	Large	180 - 256	L	1	0	1	1%	100%
10.1 - 14.3	Small	256 - 362	B	0	0	0	0%	100%
14.3 - 20	Small	362 - 512	L	0	0	0	0%	100%
20 - 40	Medium	512 - 1024	D	0	0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R	0	0	0	0%	100%
	Bedrock		BDRK	0	0	0	0%	100%
Totals				53	58	111	100%	100%

d16	d35	d50	d84	d95
0.1	0.6	9.1	40.5	67.9



PEBBLE COUNT								
Project: Upper UT to Cane Creek (Pickard)						Date: 8/28/2012		
Location: Reach 4								
Particle Counts								
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C	7	18	25	24%	24%
.04 - .08	Very Fine	.062 - .125	S	0	0	0	0%	24%
	Fine	.125 - .25	A	0	2	2	2%	26%
	Medium	.25 - .50	N	1	3	4	4%	30%
	Coarse	.50 - 1.0	D	7	0	7	7%	36%
	Very Coarse	1.0 - 2.0	S	5	0	5	5%	41%
.08 - .16	Very Fine	2.0 - 4.0		0	0	0	0%	41%
	Fine	4.0 - 5.7	G	0	5	5	5%	46%
	Fine	5.7 - 8.0	R	3	5	8	8%	53%
	Medium	8.0 - 11.3	A	2	7	9	9%	62%
	Medium	11.3 - 16.0	V	6	5	11	10%	72%
	Coarse	16.0 - 22.6	E	5	5	10	10%	82%
	Coarse	22.6 - 32.0	L	3	0	3	3%	85%
	Very Coarse	32.0 - 45.0	S	2	2	4	4%	89%
1.77 - 2.5	Very Coarse	45.0 - 64.0		5	1	6	6%	94%
	Small	64 - 90	C	3	0	3	3%	97%
	Small	90 - 128	O	2	1	3	3%	100%
	Large	128 - 180	B	0	0	0	0%	100%
7.1 - 10.1	Large	180 - 256	L	0	0	0	0%	100%
	Small	256 - 362	B	0	0	0	0%	100%
10.1 - 14.3	Small	362 - 512	L	0	0	0	0%	100%
	Medium	512 - 1024	D	0	0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R	0	0	0	0%	100%
	Bedrock		BDRK	0	0	0	0%	100%
Totals				51	54	105	100%	100%

d16	d35	d50	d84	d95
0.1	0.9	7.1	29.3	70.5



PEBBLE COUNT								
Project: Upper UT to Cane Creek (Pickard)					Date: 8/28/2012			
Location: Reach 5								
Particle Counts								
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C	5	13	18	17%	17%
.04 - .08	Very Fine	.062 - .125	S	0	0	0	0%	17%
	Fine	.125 - .25	A	0	2	2	2%	19%
	Medium	.25 - .50	N	1	4	5	5%	24%
	Coarse	.50 - 1.0	D	5	4	9	9%	33%
	Very Coarse	1.0 - 2.0	S	10	2	12	12%	45%
.08 - .16	Very Fine	2.0 - 4.0		0	1	1	1%	46%
	Fine	4.0 - 5.7	G	5	1	6	6%	51%
	Fine	5.7 - 8.0	R	4	5	9	9%	60%
	Medium	8.0 - 11.3	A	5	5	10	10%	70%
	Medium	11.3 - 16.0	V	1	9	10	10%	80%
	Coarse	16.0 - 22.6	E	0	7	7	7%	86%
	Coarse	22.6 - 32.0	L	2	1	3	3%	89%
	Very Coarse	32.0 - 45.0	S	1	6	7	7%	96%
	Very Coarse	45.0 - 64.0		2	1	3	3%	99%
2.5 - 3.5	Small	64 - 90	C	0	0	0	0%	99%
3.5 - 5.0	Small	90 - 128	O	0	0	0	0%	99%
5.0 - 7.1	Large	128 - 180	B	0	0	0	0%	99%
7.1 - 10.1	Large	180 - 256	L	0	1	1	1%	100%
10.1 - 14.3	Small	256 - 362	B	0	0	0	0%	100%
14.3 - 20	Small	362 - 512	L	0	0	0	0%	100%
20 - 40	Medium	512 - 1024	D	0	0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R	0	0	0	0%	100%
	Bedrock		BDRK	0	0	0	0%	100%
Totals				41	62	103	100%	100%

d16	d35	d50	d84	d95
0.1	1.2	5.5	19.9	42.9

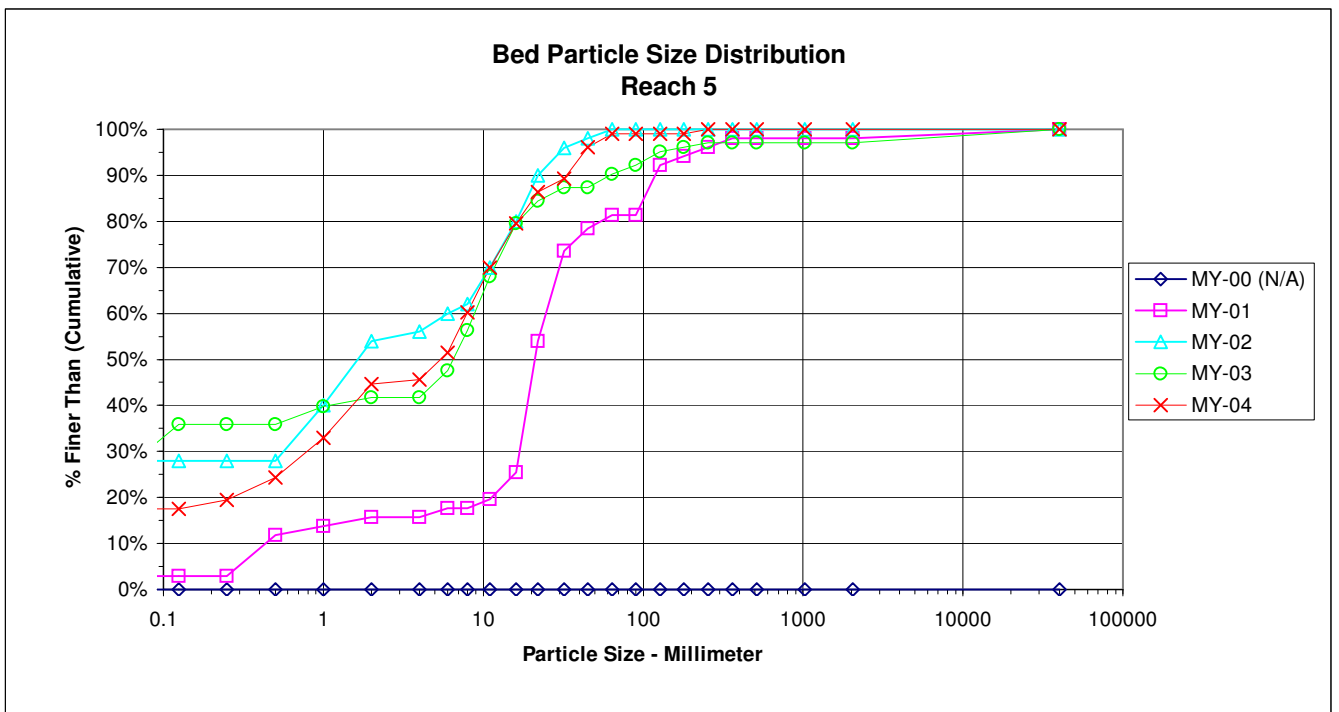


Table 10a. Baseline Stream Data Summary
Upper UT to Cane Creek (Pickard) / EEP# 395 - Reach: 1 (641 feet)

Parameter	Gauge ²	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline							
		LL	UL	Eq.	Min	Mean	Med	Max	SD ⁵	n	Min	Mean	Med	Max	SD ⁵	n	Min	Med	Max	Min	Mean	Med	Max	SD ⁵	n		
Dimension and Substrate - Riffle Only																											
Bankfull Width (ft)							11.6							11.1				10						12.4			
Floodprone Width (ft)							65							102.5				65						150			
Bankfull Mean Depth (ft)							1.2328							1.1873				1.1						0.7258			
¹ Bankfull Max Depth (ft)							1.6							1.85				1.5						1.6			
Bankfull Cross Sectional Area (ft ²)							14.3							13.15				11						9			
Width/Depth Ratio							9.4098							9.9445				9.0909						17.084			
Entrenchment Ratio							5.6034							9.237				6.5						12.097			
¹ Bank Height Ratio							1.2							1.2				1						1			
Profile																											
Riffle Length (ft)																							5		17	66	
Riffle Slope (ft/ft)							0.008							0.0073				0.0065				0.0014		0.0066	0.0212		
Pool Length (ft)																						12		20	33		
Pool Max depth (ft)																											
Pool Spacing (ft)							100						15			87			13			66	39		70	113	
Pattern																											
Channel Beltwidth (ft)						20					15			50				35			70	24		64	64		
Radius of Curvature (ft)						40					8.6			25.6				23			42	16		68	68		
Rc:Bankfull width (ft/ft)																											
Meander Wavelength (ft)						80					29			57				40			140	74		198	198		
Meander Width Ratio						1.7					1.3			4.5				3.5			7	6		16	16		
Transport parameters																											
Reach Shear Stress (competency) lb/ft ²																											
Max part size (mm) mobilized at bankfull																											
Stream Power (transport capacity) W/m ²																											
Additional Reach Parameters																											
Rosgen Classification							Degraded E4						E4						E4			C4					
Bankfull Velocity (fps)																											
Bankfull Discharge (cfs)																											
Valley length (ft)														1375													
Channel Thalweg length (ft)														1430													
Sinuosity (ft)														1.04													
Water Surface Slope (Channel) (ft/ft)														0.008													
BF slope (ft/ft)																											
³ Bankfull Floodplain Area (acres)																											
⁴ % of Reach with Eroding Banks																											
Channel Stability or Habitat Metric																											
Biological or Other																											

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing survey data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 10a. Baseline Stream Data Summary
Upper UT to Cane Creek (Pickard) / EEP# 395 - Reach: 2 (587 feet)

Parameter	Gauge ²	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline									
		LL	UL	Eq.	Min	Mean	Med	Max	SD ⁵	n	Min	Mean	Med	Max	SD ⁵	n	Min	Med	Max	Min	Mean	Med	Max	SD ⁵	n				
Dimension and Substrate - Riffle Only																													
Bankfull Width (ft)							13.8											11											
Floodprone Width (ft)							150												105										
Bankfull Mean Depth (ft)							1.9855												1.4727										
¹ Bankfull Max Depth (ft)							2.9												2										
Bankfull Cross Sectional Area (ft ²)							27.4												16.2										
Width/Depth Ratio							6.9504												7.4691										
Entrenchment Ratio							10.87												9.5455										
¹ Bank Height Ratio							1.1												1.4										
Profile																													
Riffle Length (ft)																													
Riffle Slope (ft/ft)								0.0044											0.0112										
Pool Length (ft)																													
Pool Max depth (ft)																													
Pool Spacing (ft)							31												2										
Pattern																													
Channel Beltwidth (ft)							20												40										
Radius of Curvature (ft)							22												70										
Rc:Bankfull width (ft/ft)																													
Meander Wavelength (ft)							80												540										
Meander Width Ratio							1.4												2.9										
Transport parameters																													
Reach Shear Stress (competency) lb/ft ²																													
Max part size (mm) mobilized at bankfull																													
Stream Power (transport capacity) W/m ²																													
Additional Reach Parameters																													
Rosgen Classification																													
Bankfull Velocity (fps)																													
Bankfull Discharge (cfs)																													
Valley length (ft)																													
Channel Thalweg length (ft)																													
Sinuosity (ft)																													
Water Surface Slope (Channel) (ft/ft)																													
BF slope (ft/ft)																													
³ Bankfull Floodplain Area (acres)																													
⁴ % of Reach with Eroding Banks																													
Channel Stability or Habitat Metric																													
Biological or Other																													

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing survey data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 10a. Baseline Stream Data Summary
Upper UT to Cane Creek (Pickard) / EEP# 395 - Reach: 3 (531 feet)

Parameter	Gauge ²	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline							
		LL	UL	Eq.	Min	Mean	Med	Max	SD ⁵	n	Min	Mean	Med	Max	SD ⁵	n	Min	Med	Max	Min	Mean	Med	Max	SD ⁵	n		
Dimension and Substrate - Riffle Only																											
Bankfull Width (ft)							16							11.1				16		15.2		17.8	18.3				
Floodprone Width (ft)							300							102.5				200		150		150	150				
Bankfull Mean Depth (ft)							2.1375							1.1873				2		1.2472		1.3333	1.7303				
¹ Bankfull Max Depth (ft)							3.3							1.85				2.4		2		2.3	2.5				
Bankfull Cross Sectional Area (ft ²)							34.2							13.15				32		22.2		24.4	26.3				
Width/Depth Ratio							7.4854							9.9445				8		8.7848		13.725	14.272				
Entrenchment Ratio							18.75							9.237				12.5		8.1967		8.427	9.8684				
¹ Bank Height Ratio							1.3							1.2				1		1		1	1				
Profile																											
Riffle Length (ft)																				5		33	136				
Riffle Slope (ft/ft)							0.007							0.0073				0.0049		0		0.0033	0.0108				
Pool Length (ft)																				10		31	54				
Pool Max depth (ft)																											
Pool Spacing (ft)							29							15				87		21		106	58		113	180	
Pattern																											
Channel Beltwidth (ft)							18							15				50		56		112	15		63	100	
Radius of Curvature (ft)							23							8.6				25.6		37		66	23		45	72	
Rc:Bankfull width (ft/ft)																											
Meander Wavelength (ft)							120							29				57		64		160	105		182	274	
Meander Width Ratio							1.1							1.3				4.5		3.5		7	5.9		10.2	15.4	
Transport parameters																											
Reach Shear Stress (competency) lb/ft ²																											
Max part size (mm) mobilized at bankfull																											
Stream Power (transport capacity) W/m ²																											
Additional Reach Parameters																											
Rosgen Classification							Degraded E4						E4						E4			E/C/5					
Bankfull Velocity (fps)																											
Bankfull Discharge (cfs)																											
Valley length (ft)																											
Channel Thalweg length (ft)																											
Sinuosity (ft)																											
Water Surface Slope (Channel) (ft/ft)																											
BF slope (ft/ft)																											
³ Bankfull Floodplain Area (acres)																											
⁴ % of Reach with Eroding Banks																											
Channel Stability or Habitat Metric																											
Biological or Other																											

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing survey data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 10a. Baseline Stream Data Summary
Upper UT to Cane Creek (Pickard) / EEP# 395 - Reach: 4 (570 feet)

Parameter	Gauge ²	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline							
		LL	UL	Eq.	Min	Mean	Med	Max	SD ⁵	n	Min	Mean	Med	Max	SD ⁵	n	Min	Med	Max	Min	Mean	Med	Max	SD ⁵	n		
Dimension and Substrate - Riffle Only																											
Bankfull Width (ft)							16							11.1				16		15.2		17.8	18.3				
Floodprone Width (ft)							300							102.5				200		150		150	150				
Bankfull Mean Depth (ft)							2.1375							1.1873				2		1.2472		1.3333	1.7303				
¹ Bankfull Max Depth (ft)							3.3							1.85				2.4		2		2.3	2.5				
Bankfull Cross Sectional Area (ft ²)							34.2							13.15				32		22.2		24.4	26.3				
Width/Depth Ratio							7.4854							9.9445				8		8.7848		13.725	14.272				
Entrenchment Ratio							18.75							9.237				12.5		8.1967		8.427	9.8684				
¹ Bank Height Ratio							1.3							1.2				1		1		1	1				
Profile																											
Riffle Length (ft)																				5		33	136				
Riffle Slope (ft/ft)							0.007							0.0073				0.0049		0		0.0033	0.0108				
Pool Length (ft)																				10		31	54				
Pool Max depth (ft)																											
Pool Spacing (ft)							29							15				87		21		106	58		113	180	
Pattern																											
Channel Beltwidth (ft)							18							15				56		112		63	100				
Radius of Curvature (ft)							23							8.6				37		66		45	72				
Rc:Bankfull width (ft/ft)																											
Meander Wavelength (ft)							120							29				57		64		160	105		182	274	
Meander Width Ratio							1.1							1.3				4.5		3.5		7	5.9		10.2	15.4	
Transport parameters																											
Reach Shear Stress (competency) lb/ft ²																											
Max part size (mm) mobilized at bankfull																											
Stream Power (transport capacity) W/m ²																											
Additional Reach Parameters																											
Rosgen Classification							Degraded E4						E4						E4			E/C/5					
Bankfull Velocity (fps)																											
Bankfull Discharge (cfs)																											
Valley length (ft)																											
Channel Thalweg length (ft)																											
Sinuosity (ft)																											
Water Surface Slope (Channel) (ft/ft)																											
BF slope (ft/ft)																											
³ Bankfull Floodplain Area (acres)																											
⁴ % of Reach with Eroding Banks																											
Channel Stability or Habitat Metric																											
Biological or Other																											

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing survey data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 10a. Baseline Stream Data Summary
Upper UT to Cane Creek (Pickard) / EEP# 395 - Reach: 5 (634 feet)

Parameter	Gauge ²	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline							
		LL	UL	Eq.	Min	Mean	Med	Max	SD ⁵	n	Min	Mean	Med	Max	SD ⁵	n	Min	Med	Max	Min	Mean	Med	Max	SD ⁵	n		
Dimension and Substrate - Riffle Only																											
Bankfull Width (ft)							20.3							11.1				18		14.5		15.9	20.6				
Floodprone Width (ft)							300							102.5				300		150		150	150				
Bankfull Mean Depth (ft)							2.1133							1.1873				2.1111		1.1893		1.5793	1.6164				
¹ Bankfull Max Depth (ft)							2.9							1.85				2.7		2		2.4	2.6				
Bankfull Cross Sectional Area (ft ²)							42.9							13.15				38		22.9		24.5	25.7				
Width/Depth Ratio							9.6058							9.9445				8.5263		9.1812		9.837	17.321				
Entrenchment Ratio							14.778							9.237				16.667		7.2816		9.434	10.345				
¹ Bank Height Ratio							1.6							1.2				1		1		1	1				
Profile																											
Riffle Length (ft)																					12		33	78			
Riffle Slope (ft/ft)														0.0112							0		0.0036	0.0238			
Pool Length (ft)																					15		28	54			
Pool Max depth (ft)																											
Pool Spacing (ft)															2												
Pattern																											
Channel Beltwidth (ft)						23					91			50				77		63		126	34		82	104	
Radius of Curvature (ft)						19					34			11.3				27.1		41		75	33		54	90	
Rc:Bankfull width (ft/ft)																											
Meander Wavelength (ft)						99					150			29				96		72		180	124		156	303	
Meander Width Ratio						1.1					4.5			4.5				7		3.5		7	7.8		9.8	19.1	
Transport parameters																											
Reach Shear Stress (competency) lb/ft ²																											
Max part size (mm) mobilized at bankfull																											
Stream Power (transport capacity) W/m ²																											
Additional Reach Parameters																											
Rosgen Classification											Degraded E4																
Bankfull Velocity (fps)																											
Bankfull Discharge (cfs)																											
Valley length (ft)																											
Channel Thalweg length (ft)																											
Sinuosity (ft)																											
Water Surface Slope (Channel) (ft/ft)																											
BF slope (ft/ft)																											
³ Bankfull Floodplain Area (acres)																											
⁴ % of Reach with Eroding Banks																											
Channel Stability or Habitat Metric																											
Biological or Other																											

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing survey data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

**Table 10b. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Upper UT to Cane Creek (Pickard) / EEP# 395**

Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design					As-built/Baseline				
¹ Ri% / Ru% / P% / G% / S%																				
¹ SC% / Sa% / G% / C% / B% / Be%																				
¹ d16 / d35 / d50 / d84 / d95 / di ^P / di ^{SP} (mm)																				
² Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10																				
³ Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0																				

Shaded cells indicate that these will typically not be filled in.

¹ = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave

² = Entrenchment Class - Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as visual estimates

³ = Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as the longitudinal profile

Footnotes 2,3 - These classes are loosely built around the Rosgen classification and hazard ranking breaks, but were adjusted slightly to make for easier assignment to somewhat coarser bins based on visual estimates in the field such that measurement of every segment for ER would not be necessary. The intent here is to provide the reader/consumer of design and monitoring information with a good general sense of the extent of hydrologic containment in the pre-existing and the rehabilitated states as well as comparisons to the reference distributions. ER and BHR have been addressed in prior submissions as a subsample (cross-sections as part of the design survey), however, these subsamples have often focused entirely on facilitating design without providing a thorough pre-construction distribution of these parameters, leaving the reader/consumer with a sample that is weighted heavily on the stable sections of the reach. This means that the distributions for these parameters should include data from both the cross-section surveys and the longitudinal profile and in the case of ER, visual estimates. For example, the typical longitudinal profile permits sampling of the BHR at riffles beyond those subject to cross-sections and therefore can be readily integrated and provide a more complete sample distribution for these parameters, thereby providing the distribution/coverage necessary to provide meaningful comparisons.

Data for Table 10b. Baseline Stream Summary Table is not available (Reaches 1-5)

**Table 11a. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Upper UT to Cane Creek (Pickard) / EEP# 395**

	Cross Section 1 (Pool)							Cross Section 2 (Riffle)							Cross Section 3 (Pool)							Cross Section 4 (Riffle)						
Based on fixed baseline bankfull elevation ¹	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used	598.5	598.4	598.5	598.5				596	596	596	596				591.5	591.8	591.5	591.5				594	594.4	594	594			
Bankfull Width (ft)	8.1	7.8	7.467	6.551				12.4	9.7	10.78	10.92				8.2	8.2	6.56	5.982				8.6	9.8	8.591	8.363			
Floodprone Width (ft)	-	-	-	-				150	150	150	150				-	-	-	-				150	150	150	150			
Bankfull Mean Depth (ft)	1.111	1.1	1.26	1.249				0.75	0.9	0.752	0.848				0.744	0.8	0.627	0.662				0.709	0.9	0.759	0.803			
Bankfull Max Depth (ft)	1.7	1.8	1.71	1.61				1.6	1.7	1.49	1.6				1.1	1.4	0.94	1.01				1.2	1.6	1.39	1.38			
Bankfull Cross Sectional Area (ft ²)	9	8.8	9.409	8.183				9.3	9.7	8.107	9.255				6.1	6.9	4.114	3.962				6.1	8.8	6.525	6.715			
Bankfull Width/Depth Ratio	-	-	-	-				16.53	11.1	14.34	12.88				-	-	-	-				12.12	11	11.31	10.42			
Bankfull Entrenchment Ratio	-	-	-	-				12.1	15.4	13.91	13.74				-	-	-	-				17.44	15.2	17.46	17.94			
Bankfull Bank Height Ratio	-	-	-	-				1	1	0.913	1.063				-	-	-	-				1	1	1.201	0.964			
Cross Sectional Area between end pins (ft ²)	-	-	25.62	23.24				-	-	11.1	12.42				-	-	18.75	17.82				-	-	20.96	20.34			
d50 (mm)	22	1.9	7.667	-				19.9	1.2	13.5	-				0.5	0.4	0.458	-				0.4	-	12.67	-			
	Cross Section 5 (Pool)							Cross Section 6 (Riffle)							Cross Section 7 (Riffle)							Cross Section 8 (Riffle)						
Based on fixed baseline bankfull elevation ¹	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used	592.1	592.2	592.1	592.1				588.8	588.8	588.8	588.8				589.1	588.9	589.1	589.1				587	586.9	587	587			
Bankfull Width (ft)	10.8	10.4	10.05	10.49				17.8	17.8	17.76	18.02				15.2	14.5	17.49	16.29				18.3	17.6	17.99	18.53			
Floodprone Width (ft)	-	-	-	-				150	150	150	150				150	150	150	150				150	150	150	150			
Bankfull Mean Depth (ft)	1.028	1.1	1.065	1.036				1.247	1.2	1.229	1.252				1.73	1.7	1.646	1.756				1.333	1.3	1.437	1.354			
Bankfull Max Depth (ft)	1.9	1.9	1.82	1.86				2	2	1.87	1.86				2.5	2.2	2.61	2.56				2.3	2.2	2.46	2.34			
Bankfull Cross Sectional Area (ft ²)	11.1	11.1	10.71	10.87				22.2	22.1	21.83	22.55				26.3	22.4	28.79	28.6				24.4	23.7	25.84	25.09			
Bankfull Width/Depth Ratio	-	-	-	-				14.27	14.3	14.45	14.39				8.785	9.4	10.63	9.278				13.73	13.1	12.52	13.69			
Bankfull Entrenchment Ratio	-	-	-	-				8.427	8.4	8.445	8.326				9.868	10.3	8.575	9.208				8.197	8.5	8.339	8.094			
Bankfull Bank Height Ratio	-	-	-	-				1	1	1.294	1.204				1	1	0.943	0.945				1	1	1.13	1.068			
Cross Sectional Area between end pins (ft ²)	-	-	12.4	12.95				-	-	67.28	68.81				-	-	29.78	29.09				-	-	33.55	32.6			
d50 (mm)	0.2	0.8	6.333	-				11.3	1.5	1.313	-				11.3	1.5	9.25	-				10.6	0.9	11.83	-			
	Cross Section 9 (Pool)							Cross Section 10 (Riffle)							Cross Section 11 (Riffle)							Cross Section 12 (Riffle)						
Based on fixed baseline bankfull elevation ¹	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used	585.8	585.8	585.8	585.8				584.2	584.2	584.2	584.2				582.6	582.7	582.6	582.6				582.2	582.2	582.2	582.2			
Bankfull Width (ft)	16.8	17.7	16.8	17.79				20.6	21.1	20.13	21.46				15.9	17	14.32	15.44				14.5	12.4	15.46	15.55			
Floodprone Width (ft)	-	-	-	-				150	150	150	150				150	150	150	150				150	150	150	150			
Bankfull Mean Depth (ft)	1.69	1.6	1.692	1.652				1.189	1.2	1.176	1.146				1.616	1.5	1.429	1.488				1.579	1.7	1.444	1.483			
Bankfull Max Depth (ft)	3.2	3.1	3.27	3.11				2	2	2.1	2.07				2.4	2.5	2.56	2.59				2.6	2.6	2.34	2.41			
Bankfull Cross Sectional Area (ft ²)	28.4	28.5	28.43	29.38				24.5	24.9	23.68	24.59				25.7	25.8	20.46	22.97				22.9	21.1	22.32	23.07			
Bankfull Width/Depth Ratio	-	-	-	-				17.32	17.9	17.11	18.73				9.837	11.2	10.02	10.38				9.181	7.3	10.7	10.48			
Bankfull Entrenchment Ratio	-	-	-	-				7.282	7.1	7.451	6.989				9.434	8.8	10.47	9.716				10.34	12.1	9.704	9.646			
Bankfull Bank Height Ratio	-	-	-	-				1	1	0.924	0.961				1	1	-226.6	1.12				1	1	1.107	1.124			
Cross Sectional Area between end pins (ft ²)	-	-	31.3	32.31				-	-	41.94	40.78				-	-	34.82	37.66				-	-	34.34	35.03			
d50 (mm)	0.4	0.9	13.5	-				20.3	6	7.25	-				20.3	6	14.75	-				20.3	6	13.5	-			

1 = Widths and depths for monitoring resurvey will be based on the baseline bankfull datum regardless of dimensional/depositional development. Input the elevation used as the datum, which should be consistent and based on the baseline datum established. If the performer has inherited the project and cannot acquire the datum used for prior years this must be discussed with EEP. If this cannot be resolved in time for a given years report submission a footnote in this should be included that states: "It is uncertain if the monitoring datum has been consistent over the monitoring history, which may influence calculated values. Additional data from a prior performer is being acquired to provide confirmation. Values will be recalculated in a future submission based on a consistent datum if determined to be necessary."

**Exhibit Table 11b. Monitoring Data - Stream Reach Data Summary
Upper UT to Cane Creek (Pickard) / EEP# 395 - Reach: 1 (641 feet)**

Parameter	Baseline						MY-1						MY-2						MY-3						MY-4						MY-5					
	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n
Dimension and Substrate - Riffle only																																				
Bankfull Width (ft)			12.4						12.4						9.7						10.78						10.92									
Floodprone Width (ft)			150						150						150						150						150									
Bankfull Mean Depth (ft)			0.726						0.75						0.9						0.752						0.848									
¹ Bankfull Max Depth (ft)			1.6						1.6						1.7						1.49						1.6									
Bankfull Cross Sectional Area (ft ²)			9						9.3						9.7						8.107						9.255									
Width/Depth Ratio			17.08						16.53						11.1						14.34						12.88									
Entrenchment Ratio			12.1						12.1						15.4						13.91						13.74									
¹ Bank Height Ratio			1						1						1						0.913						1.063									
Profile																																				
Riffle Length (ft)	5		17	66			5		17	66			4		19	65			3.88	12.62	10.37	29.11	9.361	11	4.47	15.66	14.42	31.83	10.08	7						
Riffle Slope (ft/ft)	0.001		0.007	0.021			0.001		0.007	0.012			0		0.009	0.086			0.013	0.047	0.023	0.131	0.042	8	0.001	0.074	0.016	0.313	0.122	6						
Pool Length (ft)							12		20	33			3		6	23			10.83	37.24	33.84	74.92	21.23	11	19.88	66.39	62.58	126.6	40.36	6						
Pool Max depth (ft)	12		20	33															1.98	2.331	2.21	3.21	0.366	11	2.065	2.315	2.118	2.75	0.338	6						
Pool Spacing (ft)	39		70	113			39		70	113			39		70	113			21.36	48.71	44.15	95.34	21.61	10	22.1	83.86	95.59	129.7	47.84	5						
Pattern																																				
Channel Beltwidth (ft)	24		64	64																																
Radius of Curvature (ft)	16		68	68																																
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)	74		198	198																																
Meander Width Ratio	6		16	16																																
Additional Reach Parameters																																				
Rosgen Classification			C4						C type						E type						E type						E type									
Channel Thalweg length (ft)			1811						650						642						642						642									
Sinuosity (ft)			1.31						1.31						1.31						1.31						1.31									
Water Surface Slope (Channel) (ft/ft)			0.0066						0.0066						0.0071						0.00744						0.00712									
BF slope (ft/ft)																					0.00832						0.00749									
² Ri% / Ru% / P% / G% / S%																			22%		66%				18%		64%									
³ SC% / Sa% / G% / C% / B% / Be%																			27%	15%	48%	7%	0%	3%	3%	23%	60%	14%	0%	0%						
⁴ d16 / d35 / d50 / d84 / d95 /																			0.09	0.123	6.556	21.42	126.1		1.1	5.4	11.5	43.4	89.6							
² % of Reach with Eroding Banks																					0%						0%									
Channel Stability or Habitat Metric																																				
Biological or Other																																				

Pattern data will not typically be collected unless visual data, dimensional data or profile data indicate significant shifts from baseline

Shaded cells indicate that these will typically not be filled in.
 1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile.
 2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table
 3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave
 4 = Of value/needed only if the n exceeds 3

**Exhibit Table 11b. Monitoring Data - Stream Reach Data Summary
Upper UT to Cane Creek (Pickard) / EEP# 395 - Reach: 2 (587 feet)**

Parameter	Exhibit Table 11b. Monitoring Data - Stream Reach Data Summary Upper UT to Cane Creek (Pickard) / EEP# 395 - Reach: 2 (587 feet)																																			
	Baseline						MY-1						MY-2						MY-3						MY-4						MY-5					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n
Bankfull Width (ft)			8.6						8.6						9.8						8.591						8.363									
Floodprone Width (ft)			150						150						150						150						150									
Bankfull Mean Depth (ft)			0.709						0.709						0.9						0.759						0.803									
Bankfull Max Depth (ft)			1.2						1.2						1.6						1.39						1.38									
Bankfull Cross Sectional Area (ft ²)			6.1						6.1						8.8						6.525						6.715									
Width/Depth Ratio			12.12						12.12						11						11.31						10.42									
Entrenchment Ratio			17.44						17.44						15.2						17.46						17.94									
Bank Height Ratio			1						1						1						1.201						0.964									
Profile																																				
Riffle Length (ft)	6		13	54			6		13	54			6		10	15			19.16	40.18	31.24	86.49	26.62	5	22.7	45.02	34.7	77.67	28.9	3						
Riffle Slope (ft/ft)	N/A		N/A	N/A			N/A		N/A	N/A			N/A		N/A	N/A			5E-04	0.009	0.005	0.019	0.009	5	0	0.006	0.003	0.015	0.008	3						
Pool Length (ft)							15		22	84			17		20	25			15.52	61.65	75.69	119.2	43.79	5	36.94	97.09	101.2	153.1	58.21	3						
Pool Max depth (ft)	15		22	84															2.16	2.53	2.48	3.055	0.381	5	1.79	2.265	2.215	2.79	0.502	3						
Pool Spacing (ft)	64		82	109			64		82	109			64		82	109			60	113.4	117.2	159.3	42.79	4	131	155.3	155.3	179.6	34.37	2						
Pattern																																				
Channel Beltwidth (ft)	33		44	61																																
Radius of Curvature (ft)	19		36	45																																
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)	122		144	159																																
Meander Width Ratio	14		17	19																																
Additional Reach Parameters																																				
Rosgen Classification			E/C5						C/E type						E type						E type						E type									
Channel Thalweg length (ft)			1357						570						588						588						588									
Sinuosity (ft)			1.21						1.21						1.21						1.21						1.21									
Water Surface Slope (Channel) (ft/ft)			N/A						N/A						N/A						N/A						0.00076									
BF slope (ft/ft)																					0.00437						0.00474									
² Ri% / Ru% / P% / G% / S%																			36%		56%				25%		53%									
³ SC% / Sa% / G% / C% / B% / Be%																			5%	71%	23%	1%	0%	0%	5%	46%	41%	6%	0%	2%						
⁴ d16 / d35 / d50 / d84 / d95 /																			0.178	0.385	0.598	5.32	16.3		0.2	0.9	1.9	38.3	88.3							
² % of Reach with Eroding Banks																					0%						0%									
Channel Stability or Habitat Metric																																				
Biological or Other																																				

Pattern data will not typically be collected unless visual data, dimensional data or profile data indicate significant shifts from baseline

Shaded cells indicate that these will typically not be filled in.
 1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile.
 2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table
 3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave
 4 = Of value/needed only if the n exceeds 3

**Exhibit Table 11b. Monitoring Data - Stream Reach Data Summary
Upper UT to Cane Creek (Pickard) / EEP# 395 - Reach: 3 (531 feet)**

Parameter	Baseline						MY-1						MY-2						MY-3						MY-4						MY-5											
	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n						
Dimension and Substrate - Riffle only																																										
Bankfull Width (ft)	15.2		17.8	18.3						16.5						16.15						17.63						17.15														
Floodprone Width (ft)	150		150	150						150						150						150						150														
Bankfull Mean Depth (ft)	1.247		1.333	1.73						1.489						1.45						1.437						1.504														
Bankfull Max Depth (ft)	2		2.3	2.5						2.25						2.1						2.24						2.21														
Bankfull Cross Sectional Area (ft ²)	22.2		24.4	26.3						24.25						22.25						25.31						25.57														
Width/Depth Ratio	8.785		13.73	14.27						11.53						11.85						12.54						11.84														
Entrenchment Ratio	8.197		8.427	9.868						9.148						9.35						8.51						8.767														
Bank Height Ratio	1		1	1						1						1						1.118						1.075														
Profile																																										
Riffle Length (ft)	5		33	136						29						96						10						54						144								
Riffle Slope (ft/ft)	0		0.003	0.011						8E-04						0.004						0.002						0.007						0.003								
Pool Length (ft)										17						37						4						20						35								
Pool Max depth (ft)	10		31	54																		3						3.38						3.51								
Pool Spacing (ft)	58		113	180						58						113						58						113						180								
Pattern																																										
Channel Beltwidth (ft)	15		63	100																																						
Radius of Curvature (ft)	23		45	72																																						
Rc:Bankfull width (ft/ft)																																										
Meander Wavelength (ft)	105		182	274																																						
Meander Width Ratio	5.9		10.2	15.4																																						
Additional Reach Parameters																																										
Rosgen Classification	E/C5						C/E type						C/E type						C/E type						C/E type																	
Channel Thalweg length (ft)	2119						518						531						531						531																	
Sinuosity (ft)	1.27						1.27						1.27						1.27						1.27																	
Water Surface Slope (Channel) (ft/ft)	0.0031						0.0025						0.0027						0.003						0.00406																	
BF slope (ft/ft)													0.00189						0.00151																							
² Ri% / Ru% / P% / G% / S%													34%						48%						49%						31%											
³ SC% / Sa% / G% / C% / B% / Be%													6%						50%						39%						4%						0%					
⁴ d16 / d35 / d50 / d84 / d95 /													0.259						0.476						1.35						20.8						62.81					
² % of Reach with Eroding Banks																			0%						0%																	
Channel Stability or Habitat Metric																																										
Biological or Other																																										

Pattern data will not typically be collected unless visual data, dimensional data or profile data indicate significant shifts from baseline

Shaded cells indicate that these will typically not be filled in.
 1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile.
 2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table
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 4 = Of value/needed only if the n exceeds 3

**Exhibit Table 11b. Monitoring Data - Stream Reach Data Summary
Upper UT to Cane Creek (Pickard) / EEP# 395 - Reach: 4 (570 feet)**

Parameter	Baseline						MY-1						MY-2						MY-3						MY-4						MY-5					
	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n
Dimension and Substrate - Riffle only																																				
Bankfull Width (ft)	15.2		17.8	18.3						18.3						17.6						17.99						18.53								
Floodprone Width (ft)	150		150	150						150						150						150						150								
Bankfull Mean Depth (ft)	1.247		1.333	1.73						1.333						1.3						1.437						1.354								
Bankfull Max Depth (ft)	2		2.3	2.5						2.3						2.2						2.46						2.34								
Bankfull Cross Sectional Area (ft ²)	22.2		24.4	26.3						24.4						23.7						25.84						25.09								
Width/Depth Ratio	8.785		13.73	14.27						13.73						13.1						12.52						13.69								
Entrenchment Ratio	8.197		8.427	9.868						8.197						8.5						8.339						8.094								
Bank Height Ratio	1		1	1						1						1						1.13						1.068								
Profile																																				
Riffle Length (ft)	5		33	136						7						23						97						5						37		
Riffle Slope (ft/ft)	0		0.003	0.011						0						0.003						0.006						0.004						0.015		
Pool Length (ft)										10						31						54						7						12		
Pool Max depth (ft)	10		31	54																								2.16						2.934		
Pool Spacing (ft)	58		113	180						58						113						180						21.99						73.49		
Pattern																																				
Channel Beltwidth (ft)	15		63	100																																
Radius of Curvature (ft)	23		45	72																																
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)	105		182	274																																
Meander Width Ratio	5.9		10.2	15.4																																
Additional Reach Parameters																																				
Rosgen Classification	E/C5						C type						C/E type						C/E type						C/E type											
Channel Thalweg length (ft)	2119						571						570						570						570											
Sinuosity (ft)	1.27						1.27						1.27						1.27						1.27											
Water Surface Slope (Channel) (ft/ft)	0.0031						0.0037						0.039						0.00278						0.00677											
BF slope (ft/ft)													0.00414						0.00327																	
² Ri% / Ru% / P% / G% / S%																																				
³ SC% / Sa% / G% / C% / B% / Be%																																				
⁴ d16 / d35 / d50 / d84 / d95 /																																				
² % of Reach with Eroding Banks													0%						0%																	
Channel Stability or Habitat Metric																																				
Biological or Other																																				

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Shaded cells indicate that these will typically not be filled in.
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 4 = Of value/needed only if the n exceeds 3

**Exhibit Table 11b. Monitoring Data - Stream Reach Data Summary
Upper UT to Cane Creek (Pickard) / EEP# 395 - Reach: 5 (634 feet)**

Parameter	Baseline																								MY-1						MY-2						MY-3						MY-4						MY-5					
	Min	Mean	Med	Max	SD ¹	n	Min	Mean	Med	Max	SD ¹	n	Min	Mean	Med	Max	SD ¹	n	Min	Mean	Med	Max	SD ¹	n	Min	Mean	Med	Max	SD ¹	n	Min	Mean	Med	Max	SD ¹	n																		
Dimension and Substrate - Riffle only																																																						
Bankfull Width (ft)	14.5		15.9	20.6			14.5	17	15.9	20.6	3.195	3	12.4	16.83	17	21.1	4.352	3	14.32	16.64	15.46	20.13	3.079	3	15.44	17.48	15.55	21.46	3.446	3																								
Floodprone Width (ft)	150		150	150			150	150	150	150	0	3	150	150	150	150	0	3	150	150	150	150	0	3	150	150	150	150	0	3																								
Bankfull Mean Depth (ft)	1.189		1.579	1.616			1.189	1.462	1.579	1.616	0.237	3	1.2	1.45	1.45	1.7	0.354	3	1.176	1.35	1.429	1.444	0.15	3	1.146	1.372	1.483	1.488	0.196	3																								
Bankfull Max Depth (ft)	2		2.4	2.6			2	2.333	2.4	2.6	0.306	3	2	2.367	2.5	2.6	0.321	3	2.1	2.333	2.34	2.56	0.23	3	2.07	2.357	2.41	2.59	0.264	3																								
Bankfull Cross Sectional Area (ft ²)	22.9		24.5	25.7			22.9	24.37	24.5	25.7	1.405	3	21.1	23.93	24.9	25.8	2.495	3	20.46	22.15	22.32	23.68	1.615	3	22.97	23.54	23.07	24.59	0.907	3																								
Width/Depth Ratio	9.181		9.837	17.32			9.181	12.11	9.837	17.32	4.522	3	7.3	12.13	11.2	17.9	5.361	3	10.02	12.61	10.7	17.11	3.912	3	10.38	13.2	10.48	18.73	4.795	3																								
Entrenchment Ratio	7.282		9.434	10.34			7.282	9.02	9.434	10.34	1.573	3	7.1	9.333	8.8	12.1	2.542	3	7.451	9.209	9.704	10.47	1.571	3	6.989	8.784	9.646	9.716	1.555	3																								
Bank Height Ratio	1		1	1			1	1	1	1	0	3	1	1	1	1	0	3	0.924	1.083	1.107	1.219	0.149	3	0.961	1.069	1.12	1.124	0.093	3																								
Profile																																																						
Riffle Length (ft)	12		33	78			12		33	78			6		29	56			3.99	25.55	27.82	59.49	18.07	9	17.75	37.55	37.64	59.19	14.78	6																								
Riffle Slope (ft/ft)	0		0.004	0.024			0		0.004	0.024			7E-04		0.004	0.011			4E-04	0.007	0.006	0.016	0.006	9	0.003	0.007	0.006	0.013	0.004	6																								
Pool Length (ft)	15		28	54			15		28	54			5		14	35			15.2	35.48	33.61	56.09	13.85	9	25.46	44.42	40.82	70.46	13.85	7																								
Pool Max depth (ft)																			3.025	3.507	3.575	4.155	0.34	9	2.94	3.508	3.465	4.05	0.374	7																								
Pool Spacing (ft)	58		83	201			58		83	201			58		83	201			23.99	61.76	61.37	96.27	26.51	8	55.92	85.96	86.41	124.4	23.14	6																								
Pattern																																																						
Channel Beltwidth (ft)	34		82	104																																																		
Radius of Curvature (ft)	33		54	90																																																		
Rc:Bankfull width (ft/ft)																																																						
Meander Wavelength (ft)	124		156	303																																																		
Meander Width Ratio	7.8		9.8	19.1																																																		
Additional Reach Parameters																																																						
Rosgen Classification	E/C4						C/E type						C/E type						C/E type						C/E type																													
Channel Thalweg length (ft)	1194						565						634						634						634																													
Sinuosity (ft)	1.24						1.24						1.24						1.24						1.24																													
Water Surface Slope (Channel) (ft/ft)	0.0023						0.0023						0.0028						N/A						0.00257																													
BF slope (ft/ft)																			0.00315						0.00308																													
² Ri% / Ru% / P% / G% / S%																			41%		58%				41%		57%																											
³ SC% / Sa% / G% / C% / B% / Be%																			10%	34%	39%	17%	0%	0%	17%	28%	54%	1%	0%	0%																								
⁴ d16 / d35 / d50 / d84 / d95 /																			0.206	1.186	9.071	66.7	127.2		0.1	1.2	5.5	19.9	42.9																									
² % of Reach with Eroding Banks																			0%						0%																													
Channel Stability or Habitat Metric																																																						
Biological or Other																																																						

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Appendix E. Hydrologic Data

Table 12. Verification of Bankfull Events Upper UT to Cane Creek (Pickard) / EEP# 395			
Date of Data Collection	Date of Occurrence	Method	Photo #
16-Nov-09	11-Nov-09	Visual observation of wrack adjacent to the stream channel and within the floodplain as the result of Tropical Storm Ida	1-2 (MY-02 Report)
17-Feb-10	5-Feb-10	Visual observations of overbank event including wrack lines and sediment deposition resulting from a 1.36 inch* rainfall event on February 5, 2010 that occurred after numerous rainfall events, within the 3 weeks prior, that totaled 3.52 inches	3-4 (MY-02 Report)
16-Jun-10	17-May-10	Visual observations of overbank event including wrack lines and sediment deposition resulting from a 4.1 inch* rainfall event on May 16-17, 2010	N/A
5-Oct-10	30-Sep-10	A 4.43 inch* rainfall event occurring between September 26-October 2, 2010	N/A
18-Jan-13	18-Jan-13	A 2.1-inch** rainfall event within 4 hours occurred less than 24 hours after a 1.3 inch rainfall within 6 hours.	N/A
18-Jan-13	18-Jan-13	A 1.6-inch** rainfall event within 1 hour occurred less than 15 hours after a 1.3 inch rainfall within 4 hours	N/A

* - Reported at KBUY Weather Station in Burlington

** - Reported at USGS 355637079122545 Rain gauge at Berry Andrews Rd near White Cross