UT Bear Creek (Phillips)
Stream Restoration Monitoring Report
EEP Project # 92719
EEP Contract # 004828
Monitoring Year 04

Submitted to:

Ecosystem Enhancement PROGRAM

NCDENR-EEP, 1652 Mail Service Center, Raleigh, NC 27699-1652

Data Collection: 2012
Construction Completed: 2006
Submitted: January 2013

Monitoring Firm

Landmark Center II, Suite 220
4601 Six Forks Road
Raleigh, NC 27609
Phone: (919) 278-2514
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Project Contact: Adam Spiller
Email: adam.spiller@kci.com
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Design Firm

Environmental Services, Inc.

524 South New Hope Road
Raleigh, NC 27610
Phone (919) 212-1760

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1.0 EXECUTIVE SUMMARY / PROJECT ABSTRACT

In 2002, the North Carolina Department of Transportation identified the Unnamed Tributary (UT) to Bear Creek Site (Phillips) in Chatham County, North Carolina as a potential stream restoration project. The 1.7-square mile watershed is located within the USGS 8-digit HUC 03030003 and the NCDWQ Sub-basin 03-06-12 of the Cape Fear River Basin. The project restored approximately 2,378 linear feet of channel - 1,921 feet on UT Bear Creek and 457 feet on unnamed tributary 2 (UT2) - and enhanced an additional 935 feet of channel on UT2. The NCDOT completed project construction in 2006, after which the project was transferred to the North Carolina Ecosystem Enhancement Program (EEP). Project goals and objectives are listed below:

Project Goals:

- Improve water quality.
- Improve riparian and in-stream habitat

Project Objectives:

- Excluding cattle from the stream channels.
- Increasing channel stability.
- Restoring dimension, pattern, and profile to UT Bear Creek and UT 2.

The riparian buffer was planted with five different species of bare root trees and two different species of live stakes. Seven vegetation monitoring plots were established in 2009, the first year of monitoring. These plots were set up following the Carolina Vegetation Survey (CVS) vegetation monitoring protocol. Based on the seven monitoring plots, the fourth-year monitoring counted an average of 399 planted stems/acre across the site. Plot 7 is the only plot that has a planted stem density less than the year three success criterion of 320 stems/acre and the year five success criteria of 260 stems/acre. This plot has 202 planted stems/acre and 1,052 total stems/acre, including volunteers. The site's average stem density including volunteers is 1,549 stems/acre with all of the vegetation plots having densities above 320 stems/acre. Three prominent exotic invasive species are found within the project buffer are Chinese privet (*Ligustrum sinense*), Japanese honeysuckle (*Lonicera japonica*), and microstegium (*Microstegium vimineum*), with the privet being especially thick in certain areas. The areas of privet have been mapped on the CCPV. Plot 4 contains one stem of princess tree (*Paulownia tomentosa*). The presence of this invasive species is limited and is not widespread throughout the site.

There are two hydrologic features on the site. The first, UT Bear Creek, has been restored by altering the dimension, pattern, and profile and is controlled vertically by numerous bedrock outcrops and cross vanes. The second feature is UT 2 and it has been divided into two reaches, UT 2A, which was enhanced, and UT 2B, which was restored. UT 2A is a straight channel that begins at Station 30+00. This reach already had banks stabilized by the mature trees that line both sides of the channel for the length of the reach. This reach was enhanced by planting native vegetation in the riparian buffer beyond the top of bank. UT 2B begins where UT 2A ends at the ford crossing at Station 39+75. This reach was restored by changing the dimension, pattern and profile of the channel from the ford to the confluence with UT Bear Creek.

During the fourth-year monitoring the site was also examined for stream stability and potential problem areas. UT Bear Creek is predominantly stable throughout the project. There is one area of floodplain erosion that has been noted in previous reports and currently is no longer active. The area has now filled in with vegetation. Also noted in last year's monitoring report and still present is a beaver dam downstream of the site that is creating backwater conditions in the lower portions of UT Bear Creek up to Station 23+00. The downstream portion of UT 2 is less backwatered than the previous year. UT 2 is predominantly stable. There are only two areas of erosion and bed degradation on UT 2. The first is at the

cross vane at Station 40+00 and the second area is along the channel at Station 43+00 where there is a small head cut.

Summary information/data related to the occurrence of items such as beaver or 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 the Restoration Plan) documents available on the EEP's website. All raw data supporting the tables and figures in the appendices are available from EEP upon request.

2.0 METHODOLOGY

The Level 2 CVS-EEP protocol (http://cvs.bio.unc.edu/methods.htm) was used to collect vegetation data from UT Bear Creek.

3.0 REFERENCES

Lee, M.T., R. K. Peet, S. D. Roberts, and T. R. Wentworth. 2006. CVS-EEP Protocol for Recording Vegetation, Version 4.0 (http://cvs.bio.unc.edu/methods.htm)

Weakley, A.S. 2006. Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas. (http://www.herbarium.unc.edu/FloraArchives/WeakleyFlora_2006-Jan.pdf)

Appendix A

Project Vicinity Map and Background Tables

DIRECTIONS TO UT BEAR CREEK SITE:
From Raleigh, take US 440 West towards US 1 South. Take the exit for 64 East, then take 15/501 South towards Pittsboro. At the circle take a right onto West St. Then take a left onto NC 902. After going through the community of Bear Creek, take a right onto Edwards Hill Church Rd.The site is on the eastern side of the road. Enter the site through gate.

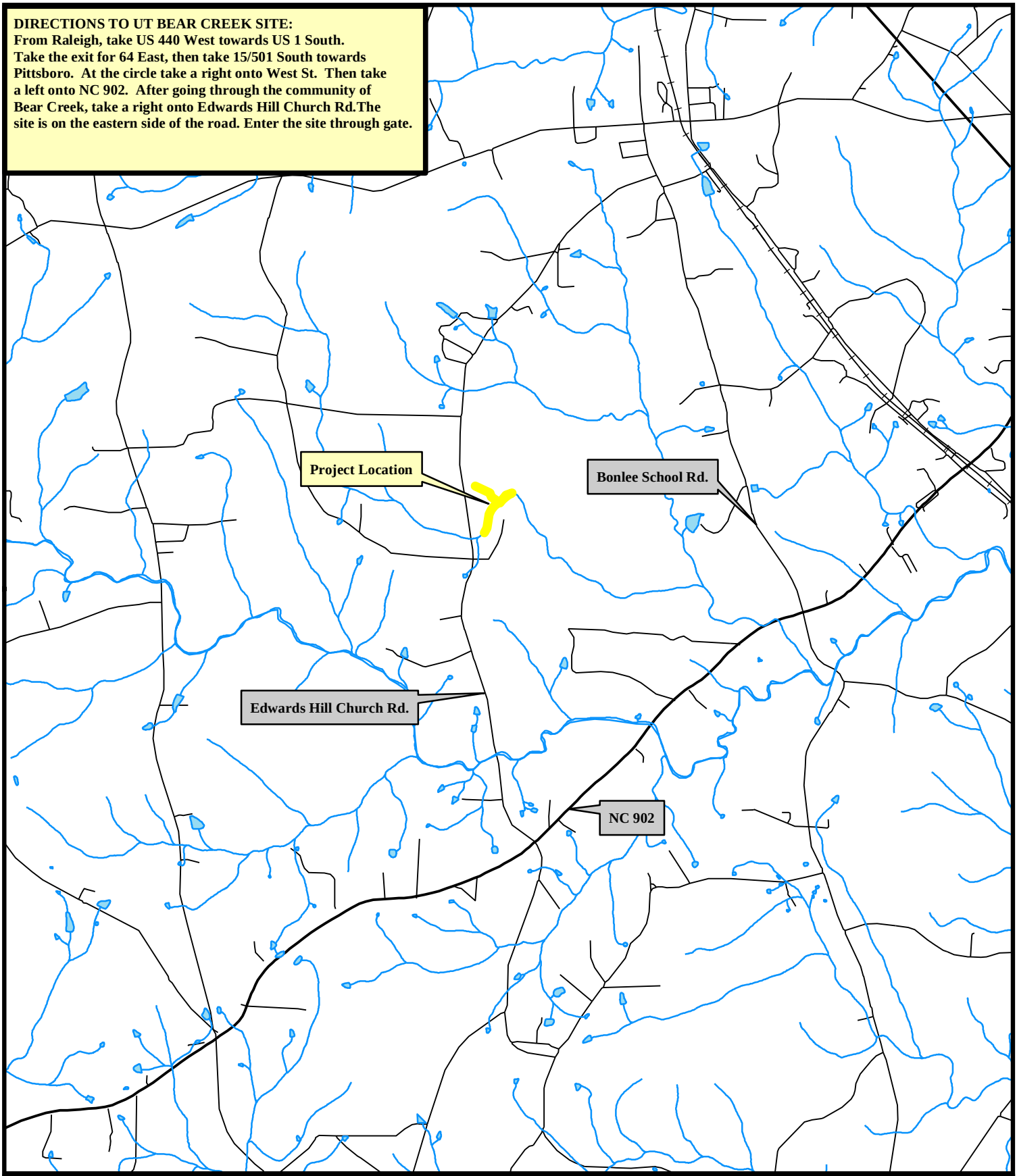


Figure 1. Site Vicinity Map
UT Bear Creek, Chatham County, EEP Project # 92719

0.5 0.25 0 0.5 1 Miles

N
W E
S

Ecosystem Enhancement Program

KCI ASSOCIATES OF NC

Table 1a. Project Components
Project Number and Name: 92719 - UT Bear Creek (Phillips)

Project Component or Reach ID	Existing Feet/Acres	Restoration Level	Approach	Footage or Acreage	Stationing	Buffer Acres	BMP Elements	Comment
UT Bear Creek	1,926	R	P2	1,942	10+00 - 29+77			Linear footage does not include stream length in easement exceptions
UT2A	935	EII	-	900	30+00 - 39+75			Linear footage does not include stream length in easement exceptions
UT2B	420	R	P2	457	39+75 - 44+32			

Table 1b. Component Summations
Project Number and Name: 92719 - UT Bear Creek (Phillips)

Restoration Level	Stream (lf)	Riparian Wetland (Ac)		Non-Riparian (Ac)	Upland (Ac)	Buffer (Ac)	BMP
		Riverine	Non-Riverine				
Restoration	2,399						
Enhancement							
Enhancement I							
Enhancement II	900						
Creation							
Preservation							
HQ Preservation							
Totals	**3,299**						
MU Totals	**2,759**						

Table 2. Project Activity and Reporting History Project Number and Name: 92719 - UT Bear Creek (Phillips)		
Elapsed Time Since Grading Complete: 6 yr **Elapsed Time Since Planting Complete: 6 yr** **Number of Reporting Years: 4**		
Activity or Report	**Data Collection Complete**	**Actual Completion or Delivery**
Concept Plan		2002
Restoration Plan		Jun 03
Final Design - 90%		
Construction		2006
As-Built Survey		Mar 06
Live Stake Planting		
Riparian Buffer Planting		
Year 1 Monitoring	Oct 2009	Dec 2009
Year 2 Monitoring	Oct 2010	Dec 2010
Year 3 Monitoring	Oct 2011	Dec 2011
Year 4 Monitoring	Oct 2012	Nov 2012

Table 3. Project Contacts Table Project Number and Name: 92719 - UT Bear Creek (Phillips)	
Design Firm	Environmental Services, Inc. 524 South New Hope Road Raleigh, North Carolina 27610 Contact: Mr. Ron Spears Phone: (919) 212-1760
Construction Contractor	Unknown
Planting Contractor	Unknown
Monitoring Performers	
MY-01-04	KCI Associates of NC Landmark Center II, Suite 220 4601 Six Forks Rd. Raleigh, NC 27609 Contact: Mr. Adam Spiller Phone: (919) 278-2514 Fax: (919) 783-9266

Table 4. Project Attribute Table Project Number and Name: 92719 - UT Bear Creek (Phillips)		
Project County	Chatham County	
Physiographic Region	Piedmont	
Ecoregion	Carolina Slate Belt	
Project River Basin	Cape Fear	
USGS HUC for Project (14 digit)	03030003070050	
NCDWQ Sub-basin for Project	03-06-12	
Within extent of EEP Watershed Plan?	U	
WRC Class (Warm, Cool, Cold)	Warm	
% of project easement demarcated	100%	
Beaver activity observed during design phase?	Yes	
Restoration Component Attribute Table		
	UT Bear Creek	UT 2
Drainage Area	1.7 sq. mi.	0.15 sq. mi.
Stream Order	Second	First
Restored length (feet)	1,921	457
Perennial or Intermittent	Perennial	Perennial
Watershed Type (Rural, Urban, Developing, etc.)	Rural	
Watershed LULC Distribution		
Urban	U	
Ag-Row Crop	U	
Ag-Livestock	U	
Forested	U	
Water/Wetlands	U	
Watershed impervious cover (%)	<10%	
NCDWQ AU/Index Number	U	
NCDWQ Classification	C (UT Bear Creek)	
303d listed?	No	
Upstream of a 303d listed segment?	No	
Reasons for 303d Listing or Stressor	-	
Total acreage of easement	11.9	
Total vegetated acreage within the easement	11.9	
Total planted acreage as part of the restoration	11.0	
Rosgen Classification of pre-existing	-	-
Rosgen Classification of As-built	C4/5	C4/5
Valley Type	U	U
Valley Slope	U	U
Valley side slope range (e.g. 2-3%)	U	U
Valley toe slope range (e.g. 2-3%)	U	U
Trout waters designation	No	
Species of concern, endangered etc.? (Y/N)	No	
Dominant soil series and characteristics		
Series	Cid-Lignum Complex	
Depth Clay%	-	-
K	-	-
T	-	-

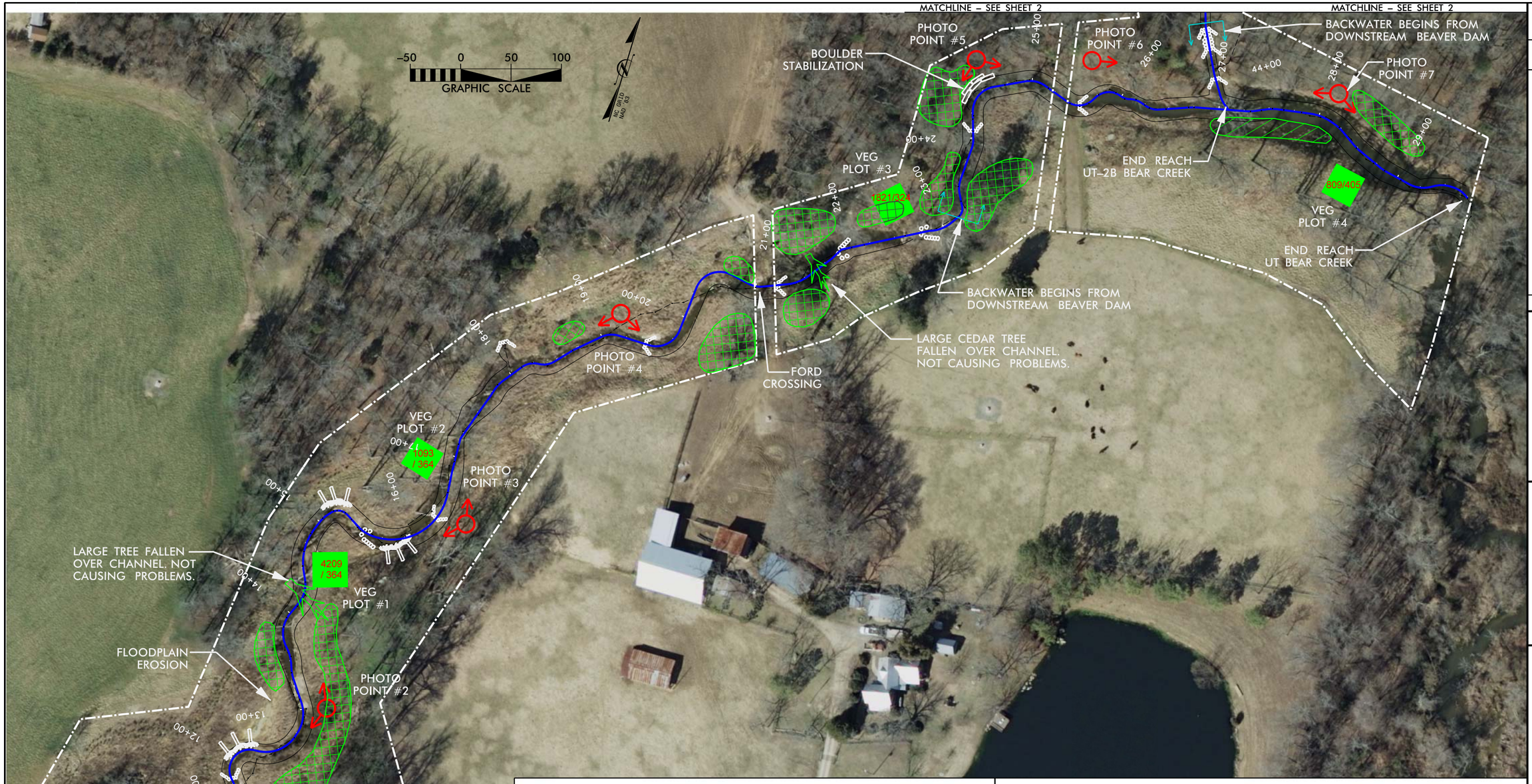
"N/A" is for items that do not apply.

"-" is for items that are unavailable.

"U" is for items that are unknown.

Appendix B

Visual Assessment Data



LEGEND

- EASEMENT BOUNDARY
- DESIGNED STATIONED CENTERLINE AND TOP OF BANK
- OLD STREAM CENTERLINE
- PHOTO POINT
- ROCK CROSS VANE & J-HOOK
- ROOTWAD

PROJECT CONDITION

- STREAM BED DEGRADATION
- BANK EROSION
- VEG PLOT ABOVE 320 TOTAL PLANTED STEMS/ACRE
- VEG PLOT BELOW 320 TOTAL PLANTED STEMS/ACRE
- LOW PLANTED STEM DENSITY
- INVASIVE SPECIES
- VEG PLOT TOTAL / PLANTED STEM DENSITY 890/423
- STRUCTURE PIPING ..... P
- STRUCTURE NOT PROTECTING BANKS ..... B

NOTE: ALL MAPPED INVASIVE SPECIES ARE CHINESE PRIVET (LIGUSTRUM SINENSE)

IMAGE SOURCE: NC 2010 STATEWIDE ORTHOIMAGERY

REVISIONS			
SYM.	DESCRIPTION	DATE	APPROVED

Ecosystem Enhancement Program

KCI ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4601 SIX FORKS ROAD
RALEIGH, NORTH CAROLINA 27609

UT BEAR CREEK (PHILLIPS)
CHATHAM COUNTY, NORTH CAROLINA
EEP PROJECT NUMBER 92719 - MY04

REACH: UT BEAR CREEK

DATE: NOV 2012
SCALE: 1" = 100'

CURRENT CONDITION PLAN VIEW

LEGEND

- EASEMENT BOUNDARY
- DESIGNED STATIONED CENTERLINE AND TOP OF BANK
- OLD STREAM CENTERLINE
- PHOTO POINT
- ROCK CROSS VANE & J-HOOK
- ROOTWAD

PROJECT CONDITION

- STREAM BED DEGRADATION
- BANK EROSION
- VEG PLOT ABOVE 320 TOTAL PLANTED STEMS/ACRE
- VEG PLOT BELOW 320 TOTAL PLANTED STEMS/ACRE
- LOW PLANTED STEM DENSITY
- INVASIVE SPECIES
- VEG PLOT TOTAL / PLANTED STEM DENSITY: 890/423
- STRUCTURE PIPING: P
- STRUCTURE NOT PROTECTING BANKS: B

NOTE: ALL MAPPED INVASIVE SPECIES ARE CHINESE PRIVET (LIGUSTRUM SINENSE)

SYM.	DESCRIPTION	DATE	APPROVED

REVISIONS

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4601 SIX FORKS ROAD
RALEIGH, NORTH CAROLINA 27609

UT BEAR CREEK (PHILLIPS)
CHATHAM COUNTY, NORTH CAROLINA
EEP PROJECT NUMBER 92719 - MY04

REACHES: UT-2A AND UT-2B BEAR CREEK

DATE: NOV 2012
SCALE: 1" = 100'

CURRENT CONDITION PLAN VIEW

SHEET 2 OF 2

Table 5a. Visual Stream Morphology Stability Assessment
Project Number and Name: 92719 - UT Bear Creek
Assessed Length 1,921 **Reach - UT Bear Creek**

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
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition*	1. Texture/Substrate - Riffle maintains coarser substrate					N/A
	3. Meander Pool Condition*	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)					N/A
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)					N/A
	4.**Thalweg Position***	1. Thalweg centering at upstream of meander bend (Run)					N/A
		2. Thalweg centering at downstream of meander (Glide)					N/A
2. Bank	**1. Scoured/ Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	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.			0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%
				Totals	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	9	9			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.	9	9			100%
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	9	9			100%
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	9	9			100%

* A longitudinal profile is not a component of monitoring UT Bear Creek. The visual assessment found a diverse bed morphology with pools and riffles that are strongly influenced by bedrock. The bottom portion of the site lacked morphological features because of backwater conditions caused by a downstream beaver dam.

Table 5b. Visual Stream Morphology Stability Assessment
Project Number and Name: 92719 - UT Bear Creek
Assessed Length 457 **Reach - UT 2B**

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
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			1	20	96%
	2. Riffle Condition*	1. Texture/Substrate - Riffle maintains coarser substrate					N/A
	3. Meander Pool Condition*	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)					N/A
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)					N/A
	4.**Thalweg Position***	1. Thalweg centering at upstream of meander bend (Run)					N/A
		2. Thalweg centering at downstream of meander (Glide)					N/A
2. Bank	**1. Scoured/ Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			2	40	96%
	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.			1	5	99%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%
				Totals	3	45	95%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	3	4			75%
	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.	3	4			75%
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	3	4			75%
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	3	3			100%

* A longitudinal profile is not a monitoring component for this tributary. During the visual assessment the only water in the channel was from the UT Bear Creek backwater, which made the evaluation of bed features difficult.

Table 6. Vegetation Condition Assessment

Project Number and Name: 92719 - UT Bear Creek (Phillips)

Planted Acreage 11.0 **Easement Acreage 11.9**

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	Pattern and Color	0	0.00	0.0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres	Pattern and Color	6	0.62	5.6%
			Total	6	0.62	5.6%
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	Pattern and Color	0	0.00	0.0%
			Cumulative Total	6	0.62	5.6%
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	1000 SF	Pattern and Color	14	0.62	5.2%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	none	Pattern and Color	0	0.00	0.0%

Stream Station Photos

PP#1 – MY01 – 11/17/09

PP#1 – MY04 – 11/5/2012

PP#2d – MY01 – 11/17/09

PP#2d – MY04 – 11/5/2012

PP#2u – MY01 – 11/17/09

PP#2u – MY04 – 11/5/2012

PP#3d – MY01 – 11/17/09


PP#3d – MY04 – 11/5/2012

PP#3u – MY01 – 11/17/09


PP#3u – MY04 – 11/5/2012

PP#4d – MY01 – 11/17/09


PP#4d – MY04 – 11/5/2012

PP#4u – MY01 – 11/17/09


PP#4u – MY04 – 11/5/2012

PP#5d – MY01 – 11/17/09


PP#5d – MY04 – 11/5/2012


PP#5u – MY01 – 11/17/09


PP#5u – MY04 – 11/5/2012

PP#6 – MY01 – 11/17/09


PP#6 – MY04 – 11/5/2012

PP #7d – MY01 – 11/17/09


PP#7d – MY04 – 11/5/2012

PP#7u – MY01 – 11/17/09


PP#7u – MY04 – 11/5/2012

PP#8d– MY01 – 11/17/09

PP#8d – MY04 – 11/5/2012

PP#8u – MY01 – 11/17/09

PP#8u – MY04 – 11/5/2012

PP#9d – MY01 – 11/17/09

PP#9d – MY04 – 11/5/2012

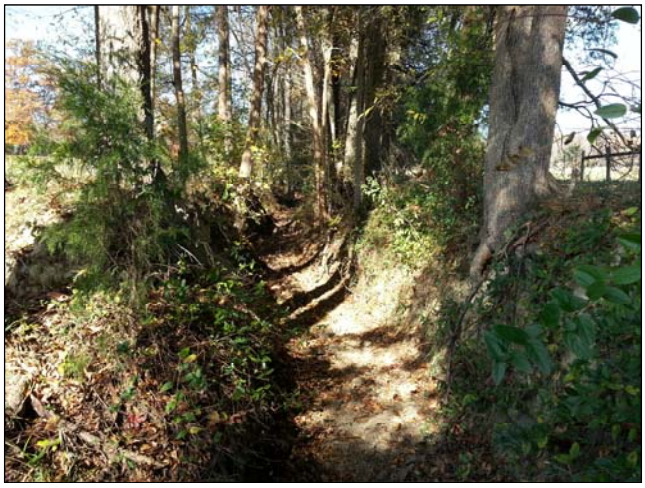
PP#9u – MY01 – 11/17/09


PP#9u – MY04 – 11/5/2012

PP#10d – MY01 – 11/17/09


PP#10d – MY04 – 11/5/2012

PP#10u – MY01 – 11/17/09


PP#10u – MY04 – 11/5/2012

PP#11 – MY01 – 11/17/09


PP#11 – MY04 – 11/5/2012

Vegetation Monitoring Plot Photos

Vegetation Plot 1: 10/2/12 – MY-04

Vegetation Plot 2: 10/2/12 – MY-04

Vegetation Plot 3: 10/2/12 – MY-04

Vegetation Plot 4: 10/2/12 – MY-04

Vegetation Plot 5: 10/2/12 – MY-04

Vegetation Plot 6: 10/2/12 – MY-04

Vegetation Plot 7: 10/2/12 – MY-04

Appendix C

Vegetation Plot Data

Table 7. Vegetation Plot Mitigation Success Summary Table Project Number and Name: 92719 - UT Bear Creek (Phillips)			
Vegetation Plot ID	**Monitoring Year 04 Planted Stem Density (stems/acre)**	**Vegetation Survival Threshold Met?**	**Monitoring Year 04 Total Stem Density (stems/acre)**
1	364	Yes	4,209
2	364	Yes	1,093
3	324	Yes	1,821
4	405	Yes	809
5	526	Yes	931
6	607	Yes	931
7	202	No	1,052

Table 8. CVS Vegetation Plot Metadata Project Number and Name: 92719 - UT Bear Creek (Phillips)	
Report Prepared By	April Helms
Date Prepared	10/30/2012 9:11
database name	KCI-2012-A.mdb
database location	M:\2007\12071067_2007 EEP OPEN END\Veg_database
computer name	12-CV76KF1
file size	59768832
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	92719
Project Name	UT Bear Creak (Phillips)
Description	Stream Restoration and Enhancment in Chatham County, NC.
River Basin	Cape Fear
length(ft)	3,313
stream-to-edge width (ft)	40
area (sq m)	22294
Required Plots (calculated)	7
Sampled Plots	7

Table 9. CVS Stem Count Total and Planted by Plot and Species
Project Number and Name: 92719 – UT Bear Creek (Phillips)

			Current Plot Data (MY4 2012)																				
			E92719-A-0001			E92719-A-0002			E92719-A-0003			E92719-A-0004			E92719-A-0005			E92719-A-0006			E92719-A-0007		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer rubrum	red maple	Tree			5																		
Asimina triloba	pawpaw	Tree																					2
Baccharis	baccharis	Shrub			1			1			1												
Baccharis halimifolia	eastern baccharis	Shrub																					
Diospyros virginiana	common persimmon	Tree				1	1	1															15
Fraxinus pennsylvanica	green ash	Tree	2	2	77	5	5	7	1	1	1	3	3	4	13	13	14	7	7	7	4	4	5
Juglans nigra	black walnut	Tree										1	1	3									
Juniperus virginiana	eastern redcedar	Tree									14												
Ligustrum sinense	Chinese privet	Exotic																					
Liquidambar styraciflua	sweetgum	Tree			2																		
Morus	mulberry	Tree																					
Paulownia tomentosa	princesstree	Exotic												1									
Platanus occidentalis	American sycamore	Tree	6	6	6			2				1	1	1			2						
Prunus serotina	black cherry	Tree						1															
Quercus falcata	southern red oak	Tree												1									
Quercus lyrata	overcup oak	Tree	1	1	2																		
Quercus michauxii	swamp chestnut oak	Tree				2	2	2				2	2	2				6	6	6			
Quercus phellos	willow oak	Tree			1	1	1	1	7	7	10	3	3	5			3	2	2	3	1	1	4
Quercus rubra	northern red oak	Tree																					
Rhus	sumac	shrub						5															
Rhus copallinum	flameleaf sumac	shrub																					
Rhus glabra	smooth sumac	shrub																					
Robinia pseudoacacia	black locust	Tree			6						10			2			1						
Salix nigra	black willow	Tree																					
Sassafras	sassafras													1									
Ulmus alata	winged elm	Tree			4			7			9						3			7			
Ulmus americana	American elm	Tree																					
Ulmus rubra	slippery elm	Tree																					
Stem count			9	9	104	9	9	27	8	8	45	10	10	20	13	13	23	15	15	23	5	5	26
size (ares)			1			1			1			1			1			1			1		
size (ACRES)			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
Species count			3	3	9	4	4	9	2	2	6	5	5	9	1	1	5	3	3	4	2	2	4
Stems per ACRE			364	364	4209	364	364	1093	324	324	1821	405	405	809	526	526	931	607	607	931	202	202	1052

P-LS – Planted Live Stakes P-all – Planted Stems Total (with Live Stakes) T – Total (Planted Including Live Stakes and Volunteers)

Table 9. CVS Stem Count Total and Planted by Plot and Species continued
Project Number and Name: 92719 – UT Bear Creek (Phillips)

			Annual Means											
			MY4 (2012)			MY3 (2011)			MY2 (2010)			MY1 (2009)		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer rubrum	red maple	Tree			5			6						2
Asimina triloba	pawpaw	Tree			2									
Baccharis	baccharis	Shrub			3			3						4
Baccharis halimifolia	eastern baccharis	Shrub									1			
Diospyros virginiana	common persimmon	Tree	1	1	16	1	1	15	1	1	1	1	1	17
Fraxinus pennsylvanica	green ash	Tree	35	35	115	35	35	105	35	35	57	36	36	135
Juglans nigra	black walnut	Tree	1	1	3	1	1	6	1	1	1			9
Juniperus virginiana	eastern redcedar	Tree			14			11						3
Ligustrum sinense	Chinese privet	Exotic												10
Liquidambar styraciflua	sweetgum	Tree			2			7			5			15
Morus	mulberry	Tree												2
Paulownia tomentosa	princesstree	Exotic			1									1
Platanus occidentalis	American sycamore	Tree	7	7	11	7	7	7	7	7	7	7	7	7
Prunus serotina	black cherry	Tree			1			1						2
Quercus falcata	southern red oak	Tree			1									
Quercus lyrata	overcup oak	Tree	1	1	2	1	1	1	1	1	1	1	1	1
Quercus michauxii	swamp chestnut oak	Tree	10	10	10	10	10	10	11	11	11	12	12	12
Quercus phellos	willow oak	Tree	14	14	27	14	14	31	14	14	23	14	14	23
Quercus rubra	northern red oak	Tree						1						
Rhus	sumac	shrub			5						1			
Rhus copallinum	flameleaf sumac	shrub						5						
Rhus glabra	smooth sumac	shrub												1
Robinia pseudoacacia	black locust	Tree			19			3						4
Salix nigra	black willow	Tree												1
Sassafras	sassafras				1									
Ulmus alata	winged elm	Tree			30			47			1			3
Ulmus americana	American elm	Tree												4
Ulmus rubra	slippery elm	Tree												39
Stem count			69	69	268	69	69	259	70	70	109	71	71	295
size (ares)			7			7			7			7		
size (ACRES)			0.17			0.17			0.17			0.17		
Species count			7	7	19	7	7	16	7	7	11	6	6	21
Stems per ACRE			399	399	1549	399	399	1497	405	405	630	410	410	1705

Appendix D

Hydrologic Data

Table 10. Verification of Bankfull Events			
Project Number and Name: 92719 - UT Bear Creek (Phillips)			
Date of Data Collection	**Date of Occurrence**	**Method**	**Photo Number**
11/17/2009	11/13/2009	Site visit to evaluate indicators of stage after storm events	N/A
10/8/2010	9/30/2010	Site visit to evaluate indicators of stage after storm	N/A
8/16/2011	unknown	Crest gauge	N/A
11/5/2012	unknown	Crest gauge	N/A