Lick Creek Stream Restoration Site
MONITORING REPORT 2009 (Year 4)

Cataloging Unit: 0303004 EEP Contract #: D04013-1

Submitted to:

North Carolina Department of Environment and Natural Resources
North Carolina Ecosystem Enhancement Program
1652 Mail Service Center
Raleigh, NC 27699-1652

Submitted by:

Restoration Systems, LLC
1101 Haynes Street, Suite 211
Raleigh, North Carolina 27604

December 11, 2009

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MONITORING REPORT 2009 (Year 4)

Prepared for:

Restoration Systems, LLC
1101 Haynes Street, Suite 211
Raleigh, North Carolina 27604

Prepared by:

Wolf Creek Engineering, PLLC
51 North Knob Lane
Weaverville, NC 28787

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EXECUTIVE SUMMARY

The Lick Creek Stream Restoration Site located within the Cape Fear River Basin, consists of approximately 9,568 linear feet of Priority 1 stream restoration of portions of Lick Creek and Wallace Branch. These reaches consist of perennial, second and third order streams that have historically been impacted by riparian and bank vegetation removal, the introduction of agricultural ditch inputs, channel straightening, and unrestricted livestock access. The constructed stream channels have restored appropriate morphology including riffle-pool bed form and channel pattern. Cross-vanes, J-Hook vanes, and in-stream log structures have been integrated into the channel to provide grade control, maintain stable stream banks while the riparian vegetation reestablishes, and provide in-stream habitat.

Hydrology

Following completion of construction in March of 2006, the site has been subjected to at least five greater-than-bankfull events and several near bankfull events. In June of 2006, Hurricane Alberto crossed central North Carolina resulting in five inches of rainfall on-site and water elevations three feet above bankfull. In November of 2006, heavy rainfall resulted in water elevations up to two feet above bankfull. In August and September of 2008, remnants of Tropical Storm Fay and Hurricane Hannah resulted in water elevations approximately one to two feet above bankfull. In October of 2007, the crest gages recorded a bankfull event on both Lick Creek and Wallace Branch. During the summer of 2009, heavy rainfall resulted in an event that overtopped the crest gage located within the Wallace Branch monitoring reach. It is estimated from debris lines that this was approximately 1' above bankfull. Five additional events including Hurricane Ernesto resulted in water elevations within one to two feet below bankfull. It should be noted that the summers of 2007 and 2008 have been some of the most severe droughts on record for the state of North Carolina.

Stream

Most of the stream reaches have managed the extreme flow events of the first four years. Areas of persistent bank scour and in-stream structure issues that were identified in the 2008 Monitoring Report were repaired in January of 2009. As part of the repairs, brush toes were installed in several meander bends where bank erosion had been observed. The repaired areas were inspected in October of 2009 as a part of this monitoring period and appeared to be stable and in sound condition. Cross section and profile surveys indicate that the channel form is consistent with the Year 3 surveys.

Vegetation

Native woody and herbaceous species were used to establish at minimum a fifty foot wide riparian buffer on each side of the restored reach. Planted herbaceous species have successfully established throughout the majority of the site along with volunteer species from upstream seed sources. In areas of weak bank vegetation, additional live-stakes were installed in 2007 and are becoming well established.

In portions of the project upstream of Lower Moncure Road, cattle accessed the buffer through an opened agricultural gate at the ford crossing on Wallace Branch. Due to heavy and prolonged grazing, the planted buffer suffered severe damage.

The riparian buffer planting had an overall survival rate of 67% with additional volunteer species taking root. The average stem density for the Site is 536 trees per acre. A number of Chinese privet (*Ligustrum sinense*) stems are emerging in areas where invasive species removal previously occurred.

Planned Action

1) Continued visual monitoring of areas of concern.
2) Re-seed areas of weak vegetation along banks and terrace.

1.0 PROJECT BACKGROUND

1.1 LOCATION AND SETTING

The Lick Creek Stream Restoration Site is located approximately 2.6 miles northeast of the City of Sanford in rural Lee County, North Carolina. From Raleigh, NC take US-1 south, take Colon Rd exit, turn left onto Colon Road, turn left on Riddle Road, turn right on Lower Moncure Road and the site is approximately ¼ mile on the left and right side of the road. The project reach is located in the Lick Creek watershed of the Cape Fear River Basin (United States Geological Survey (USGS) 14-digit Hydrologic Unit 03030004010010) within North Carolina Division of Water Quality (NCDWQ) sub-basin 03-06-07. The 03-06-07 sub-basin contains all of the Lick Creek drainage area as well as all other drainages to the 25-river miles of the Cape Fear River extending from near the confluence at Lick Creek in Lee County to near Buies Creek in Harnett County. This sub-basin is primarily forested, although agriculture accounts for a significant portion of the land-use.

1.2 PROJECT STRUCTURE AND OBJECTIVES

The pre-construction site consisted of approximately 51 acres of floodplain, 5,371 linear feet of stream designated as Lick Creek, and 3,512 linear feet of stream designated as Wallace Branch. These reaches consist of perennial, second and third order streams that have historically been impacted by riparian and bank vegetation removal, the introduction of agricultural ditch inputs, channel straightening, unrestricted livestock access, and the increasing development of the contributing drainage area. Prior land use within the site consists of forested areas and pasture.

The primary goals and objectives of the project were to improve local water quality, enhance flood attenuation and restore aquatic and riparian habitat. The overall mitigation strategy consisted of reconstruction of the stream channels to restore stable channel morphology, construction of in-stream habitat and grade/bank stabilization structures, exclusion of livestock, and reestablishment of native riparian buffers greater than 50 feet in width.

The project is divided into three distinct mitigation elements: Reach 1 consists of Wallace Branch from the upstream end of the site to its confluence with Lick Creek. Reach 2 consists of Lick Creek from the upstream end of the site to its confluence with Wallace Branch. Reach 3 consists of Lick Creek from the confluence with Wallace Branch to the downstream end of the site.

Table 1. Project Structure and Objectives – Lick Creek Stream Restoration Site (D04013-1)

Reach ID	Mitigation Type	Priority Level	Linear Footage	Stationing	Description
1	Restoration	P1	3,690 ft	10+00 – 46+90	3,690 ft of channel relocation of Wallace Branch
2	Restoration	P1	1,870 ft	10+00 – 28+70	1,870 ft of channel relocation of Upper Lick Creek
3	Restoration	P1	4,008 ft	28+70 – 65+20	3,650 ft of channel relocation of Lower Lick Creek and 358 ft of channel relocation of an Unnamed Tributary
		Total	**9,568 ft**		

1.3 PROJECT BACKGROUND

Table 2. Project Activity and Reporting History – Lick Creek Stream Restoration Site (D04013-1)

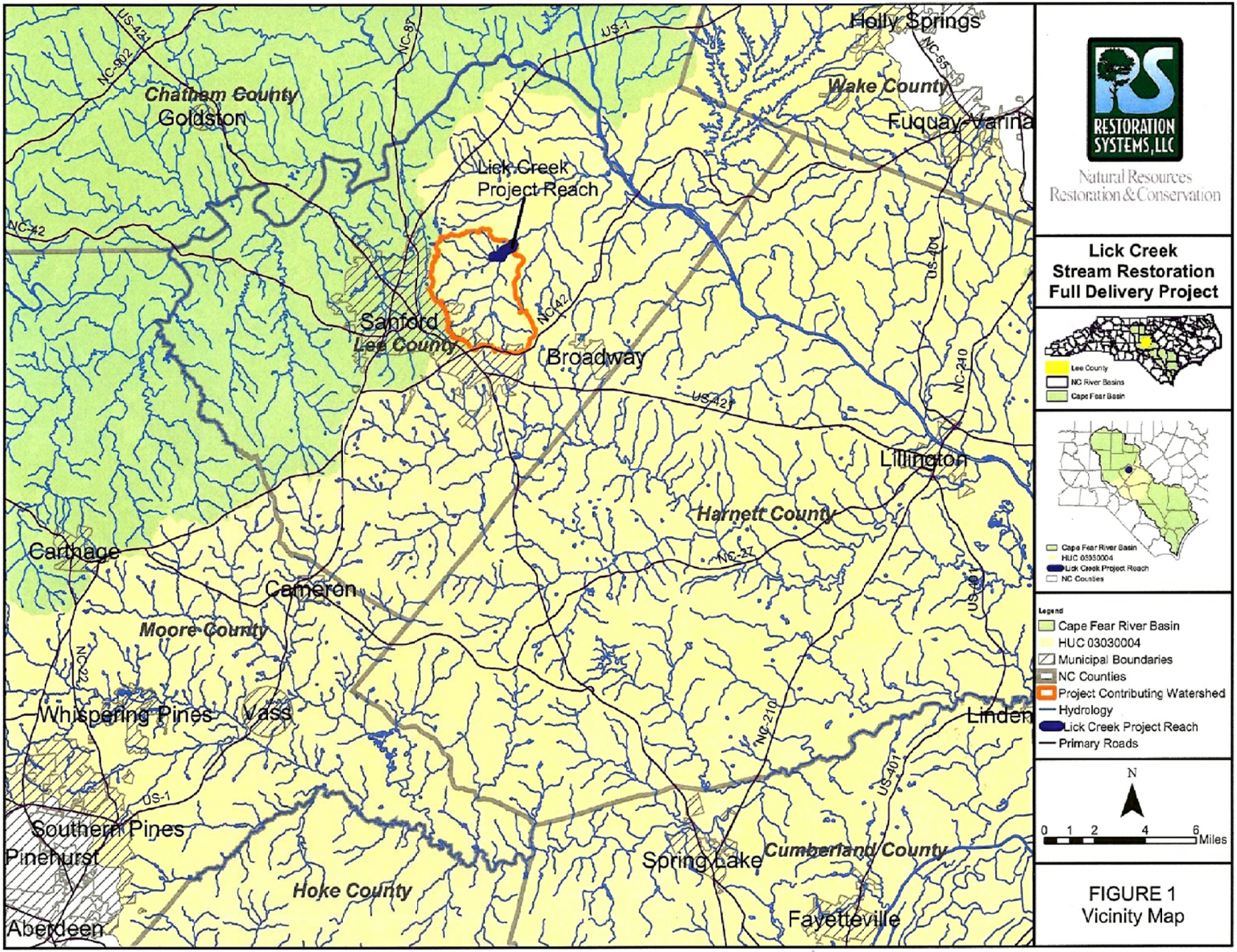
Activity or Report	Scheduled Completion	Data Collection Complete	Actual Completion or Delivery
Restoration Plan	Oct-04	N/A	Apr-05
Final Design – (at least 90% complete)	Oct-04	N/A	Apr-05
Construction	Mar-05	N/A	Mar-06
Temporary S&E mix applied to entire project area	Mar-05	N/A	Apr-06
Permanent seed mix applied to entire project area	Mar-05	N/A	Apr-06
Live stakes planting	Mar-05	N/A	Apr-06
Bare root trees planting	Mar-05	N/A	Apr-06
Mitigation Plan / As-built (Year 0 Monitoring-baseline)	Mar-05	May-06	Jun-06
Maintenance following Hurricane Alberto (Log vanes added and bank repairs)	N/A	N/A	Nov-06
Year 1 Monitoring	Nov-06	Dec-06	Dec-06
Year 2 Monitoring	Nov-07	Nov-07	Dec-07
Year 3 Monitoring	Nov-08	Oct-08	Nov-08
Maintenance (Brush toes added to stabilize scoured banks)	N/A	N/A	Jan-09
Year 4 Monitoring	Nov-09	Oct-09	Dec-09
Year 5 Monitoring	Nov-10		

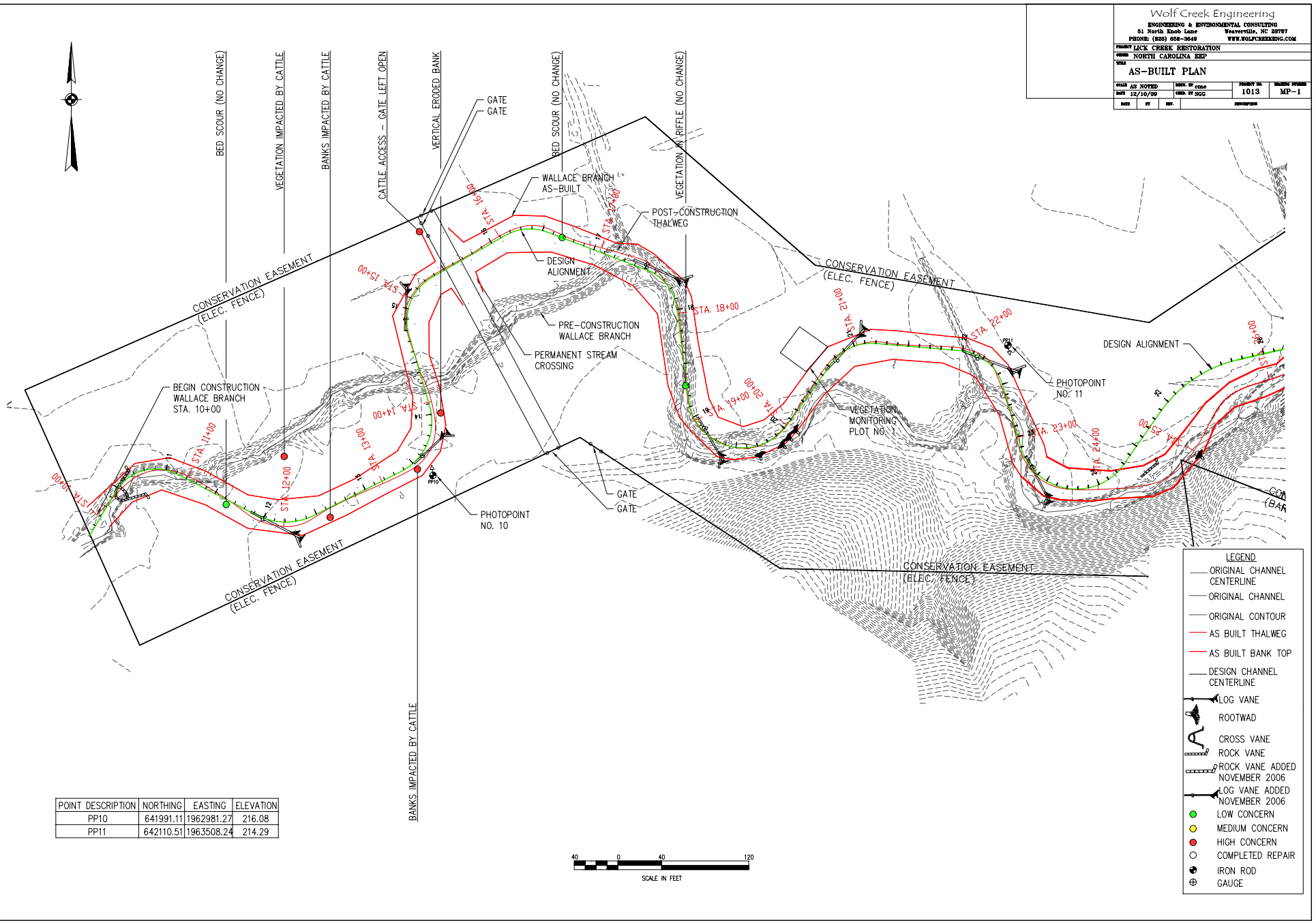
Table 3. Project Contact Information – Lick Creek Stream Restoration Site (D04013-1)

Designer URS Corporation	1600 Perimeter Park Drive, Suite 400 Morrisville, NC 27560
Construction Contractor North State Environmental, Inc.	2889 Lowery Street, Suite B Winston-Salem, NC 27101 Contact: Darrell Westmoreland, Tel. 336-725-2010
Planting Contractor H & J Forestry Services	910-264-1612
Seeding Contractor North State Environmental, Inc. Nursery Stock Suppliers	2889 Lowery Street, Suite B Winston-Salem, NC 27101 Contact: Darrell Westmoreland, Tel. 336-725-2010 S.C. Supertree Nursery, Tel 800-222-1290
Monitoring Performer Wolf Creek Engineering	51 North Knob Lane Weaverville, NC 28787 Contact: Grant Ginn, Tel. 828-658-3649

Table 4. Project Background Information – Lick Creek Stream Restoration Site (D04013-1)

Project County:	Lee County, NC
Drainage Area: Reach 1: Wallace Branch Reach 2: Lick Creek Reach 3: Lick Creek	 4.94 mi^2 8.86 mi^2 13.9 mi^2
Estimated Drainage % Impervious Cover: Reach 1: Wallace Branch Reach 2: Lick Creek Reach 3: Lick Creek	 <5% 5% 5%
Stream Order: Reach 1: Wallace Branch Reach 2: Lick Creek Reach 3: Lick Creek	 2 2 3
Physiographic Region	Piedmont
Ecoregion	Triassic Basin
Rosgen Classification of As-Built	E5
Cowardin Classification	Piedmont/Mountain Bottomland Forrest
Dominant Soil Types Reach 1: Wallace Branch Reach 2: Lick Creek Reach 3: Lick Creek	 Congaree Silt Loam (Cp) Congaree Silt Loam (Cp) Congaree Silt Loam (Cp)
Reference site ID	UT to Reedy Creek
USGS HUC for Project and Reference sites	03030004
NCDWQ Sub-basin for Project and Reference	03-06-07
NCDWQ classification for Project and Reference	WS-IV
Any portion of any project segment 303d listed?	No
Any portion of any project segment upstream of a 303d listed segment?	No
Reasons for 303d listing or stressor?	N/A
% of project easement fenced	100%


Holly Springs
Wake County
Fuquay-Varina
Chatham County
Goldston
Lick Creek
Project Reach
Sanford
Lee County
Broadway
Lillington
Harnett County
Carthage
Cameron
Moore County
Whispering Pines
Vass
Linden
Southern Pines
Pinehurst
Aberdeen
Hoke County
Spring Lake
Cumberland County
Fayetteville
US-421
NC-902
NC-87
US-1
NC-55
NC-42
US-401
NC-210
NC-27
NC-22
Natural Resources
Restoration & Conservation
Lick Creek
Stream Restoration
Full Delivery Project
Lee County
NC River Basins
Cape Fear Basin
Cape Fear River Basin
HUC 03030004
Lick Creek Project Reach
NC Counties
Legend
Cape Fear River Basin
HUC 03030004
Municipal Boundaries
NC Counties
Project Contributing Watershed
Hydrology
Lick Creek Project Reach
Primary Roads
N
0 1 2 4 6 Miles
FIGURE 1
Vicinity Map



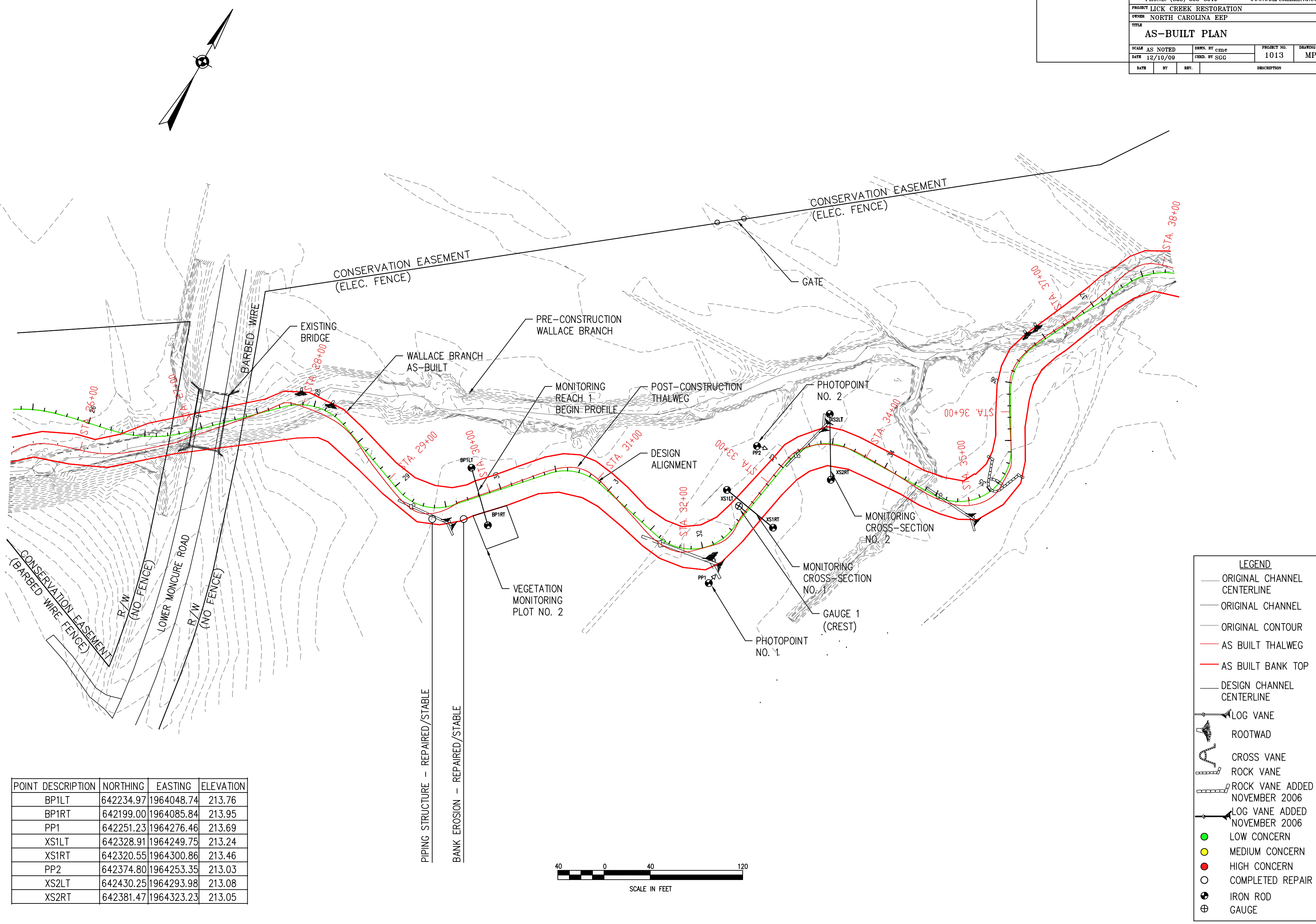
POINT DESCRIPTION	NORTHING	EASTING	ELEVATION
PP10	641991.11	1962981.27	216.08
PP11	642110.51	1963508.24	214.29

Wolf Creek Engineering
ENGINEERING & ENVIRONMENTAL CONSULTING
51 North Knob Lane Weaverville, NC 28787
PHONE: (828) 658-3649 WWW.WOLFCREEKENG.COM

PROJECT: LICK CREEK RESTORATION
OWNER: NORTH CAROLINA EEP
TITLE: AS-BUILT PLAN

SCALE: AS NOTED | DRWN. BY: cme | PROJECT NO.: 1013 | DRAWING NUMBER: MP-2
DATE: 12/10/09 | CHKD. BY: SGG

DATE	BY	REV.	DESCRIPTION



POINT DESCRIPTION	NORTHING	EASTING	ELEVATION
BP1LT	642234.97	1964048.74	213.76
BP1RT	642199.00	1964085.84	213.95
PP1	642251.23	1964276.46	213.69
XS1LT	642328.91	1964249.75	213.24
XS1RT	642320.55	1964300.86	213.46
PP2	642374.80	1964253.35	213.03
XS2LT	642430.25	1964293.98	213.08
XS2RT	642381.47	1964323.23	213.05

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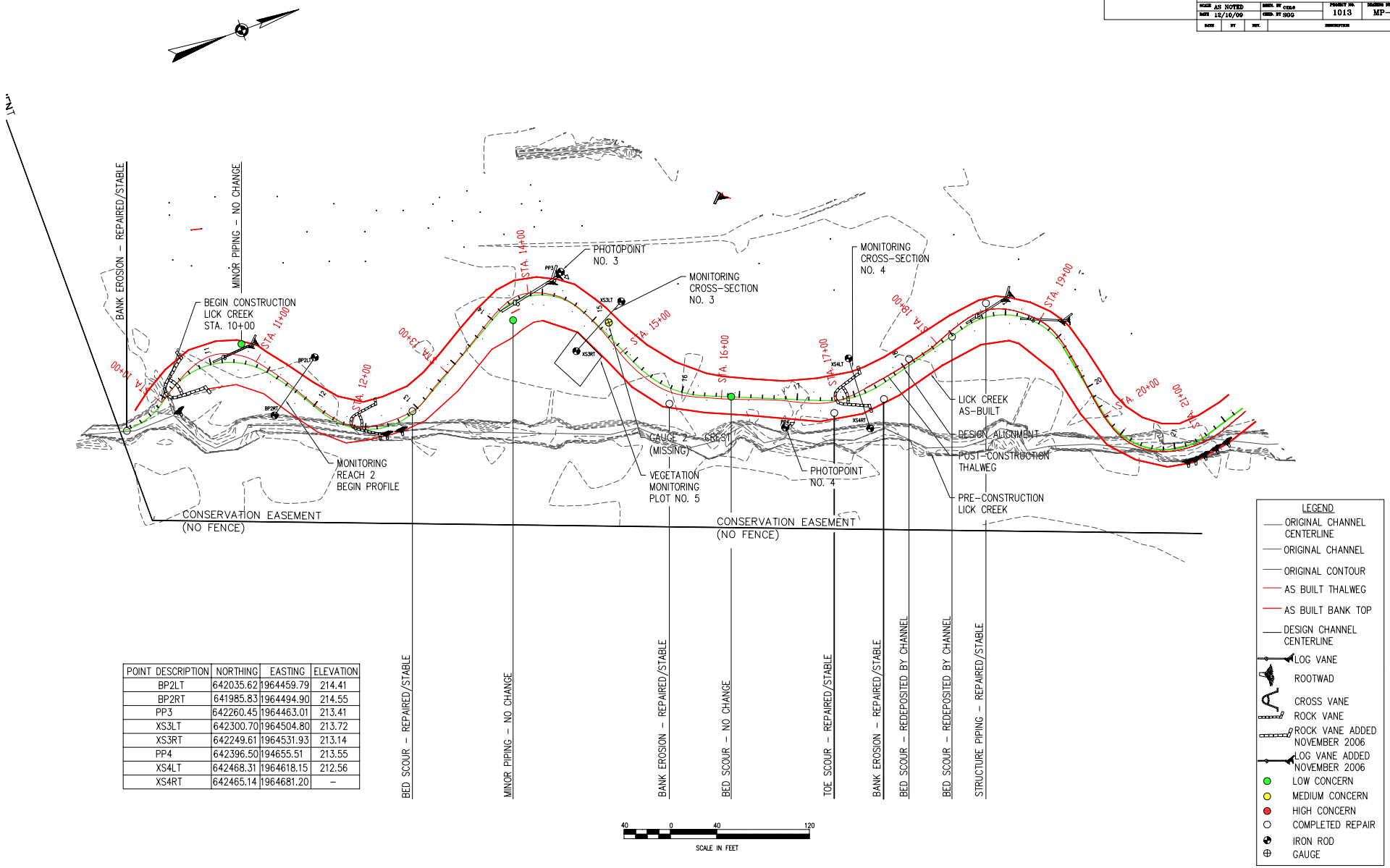
PROJECT: LICK CREEK RESTORATION
OWNER: NORTH CAROLINA EEP
TITLE: AS-BUILT PLAN

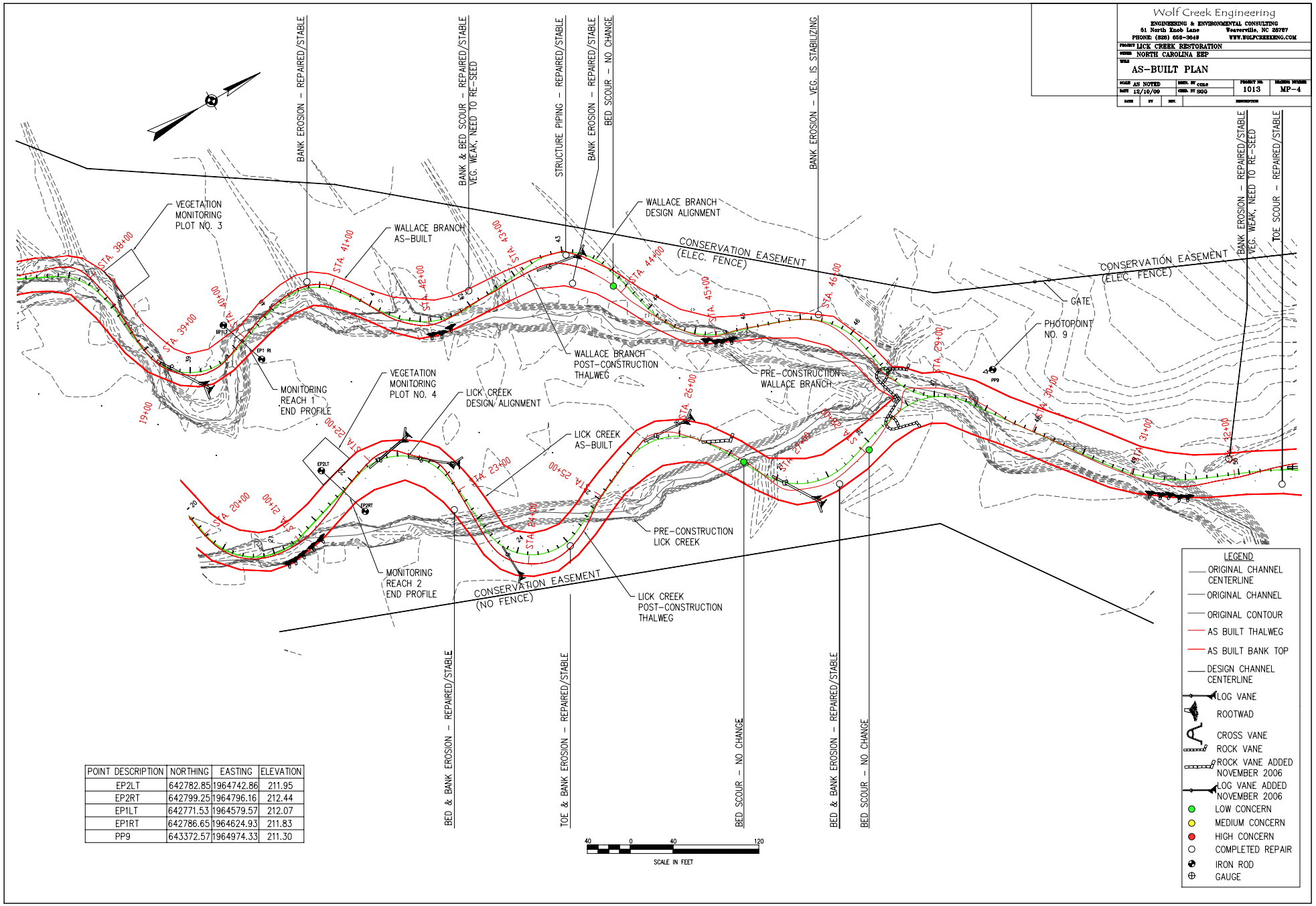
SCALE	DESIGN BY	PROJECT NO.	DRAWING NUMBER
AS NOTED	cms	1013	MP-3
DATE	CHKD. BY		
12/10/09	SGG		

DATE	BY	REV.	DESCRIPTION

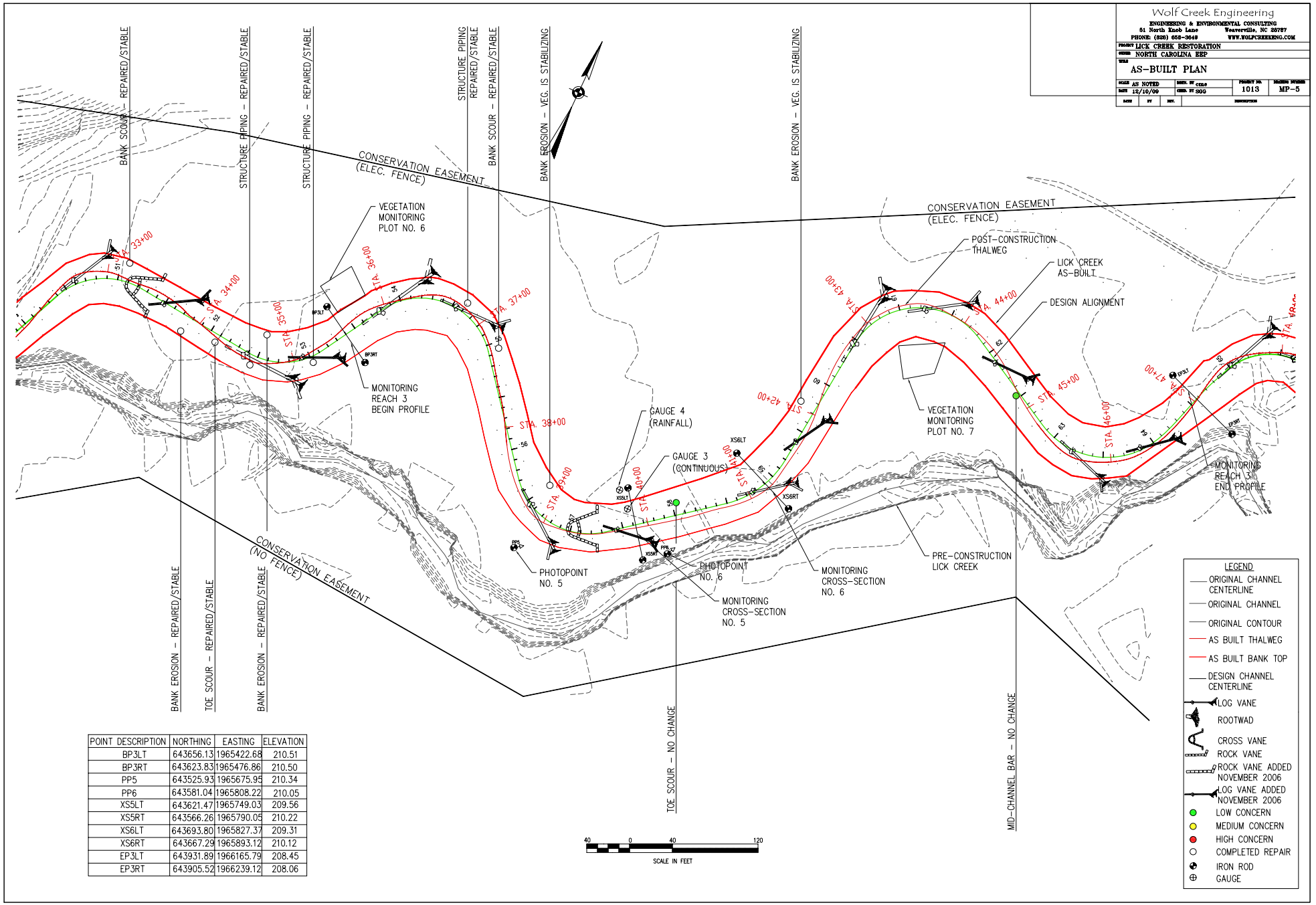


POINT DESCRIPTION	NORTHING	EASTING	ELEVATION
BP2LT	642035.62	1964459.79	214.41
BP2RT	641985.83	1964494.90	214.55
PP3	642260.45	1964463.01	213.41
XS3LT	642300.70	1964504.80	213.72
XS3RT	642249.61	1964531.93	213.14
PP4	642396.50	194655.51	213.55
XS4LT	642468.31	1964618.15	212.56
XS4RT	642465.14	1964681.20	–

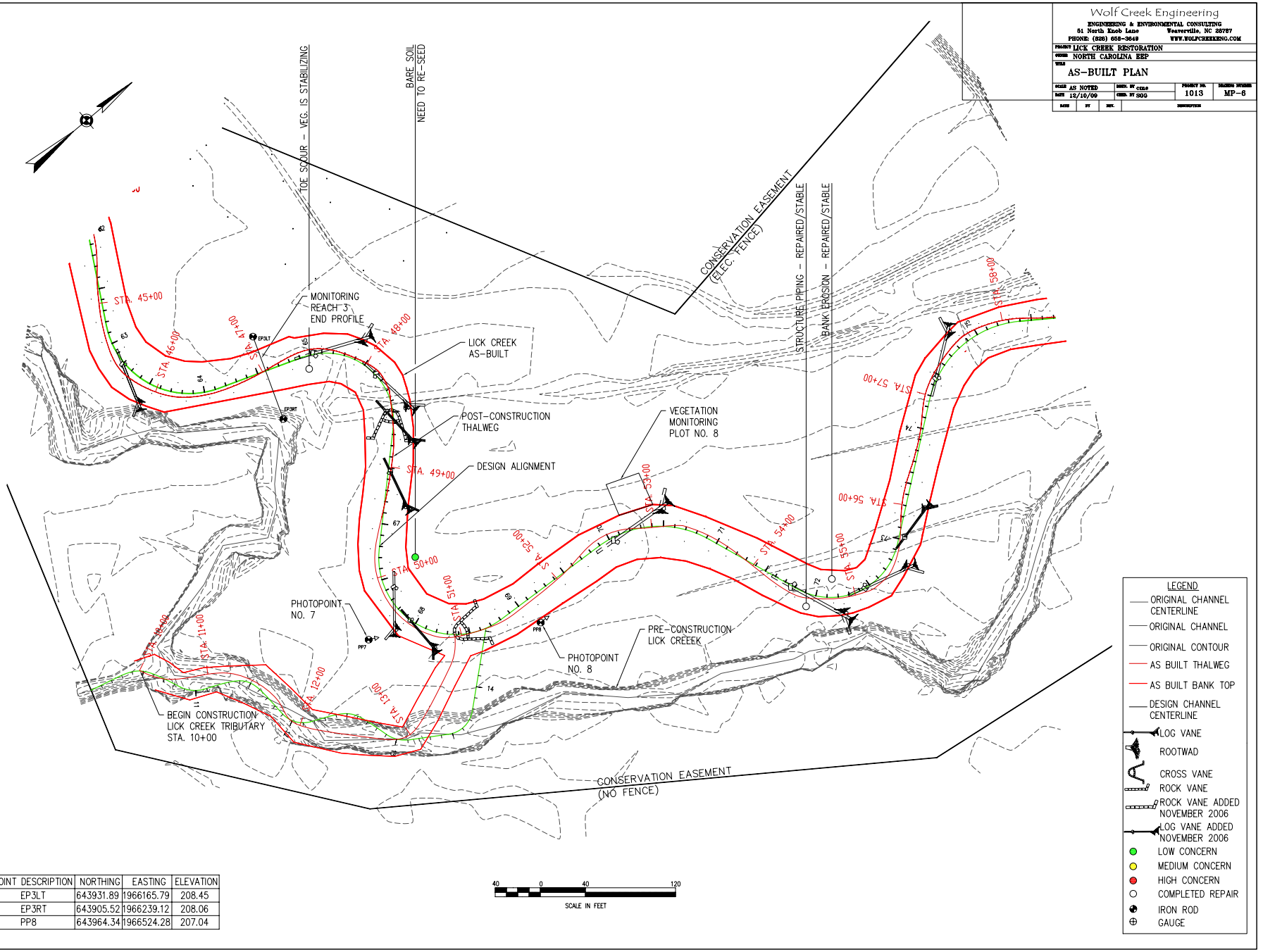
LEGEND
- ORIGINAL CHANNEL CENTERLINE
- ORIGINAL CHANNEL
- ORIGINAL CONTOUR
- AS BUILT THALWEG
- AS BUILT BANK TOP
- DESIGN CHANNEL CENTERLINE
- LOG VANE
- ROOTWAD
- CROSS VANE
- ROCK VANE
- ROCK VANE ADDED NOVEMBER 2006
- LOG VANE ADDED NOVEMBER 2006
- LOW CONCERN
- MEDIUM CONCERN
- HIGH CONCERN
- COMPLETED REPAIR
- IRON ROD
- GAUGE



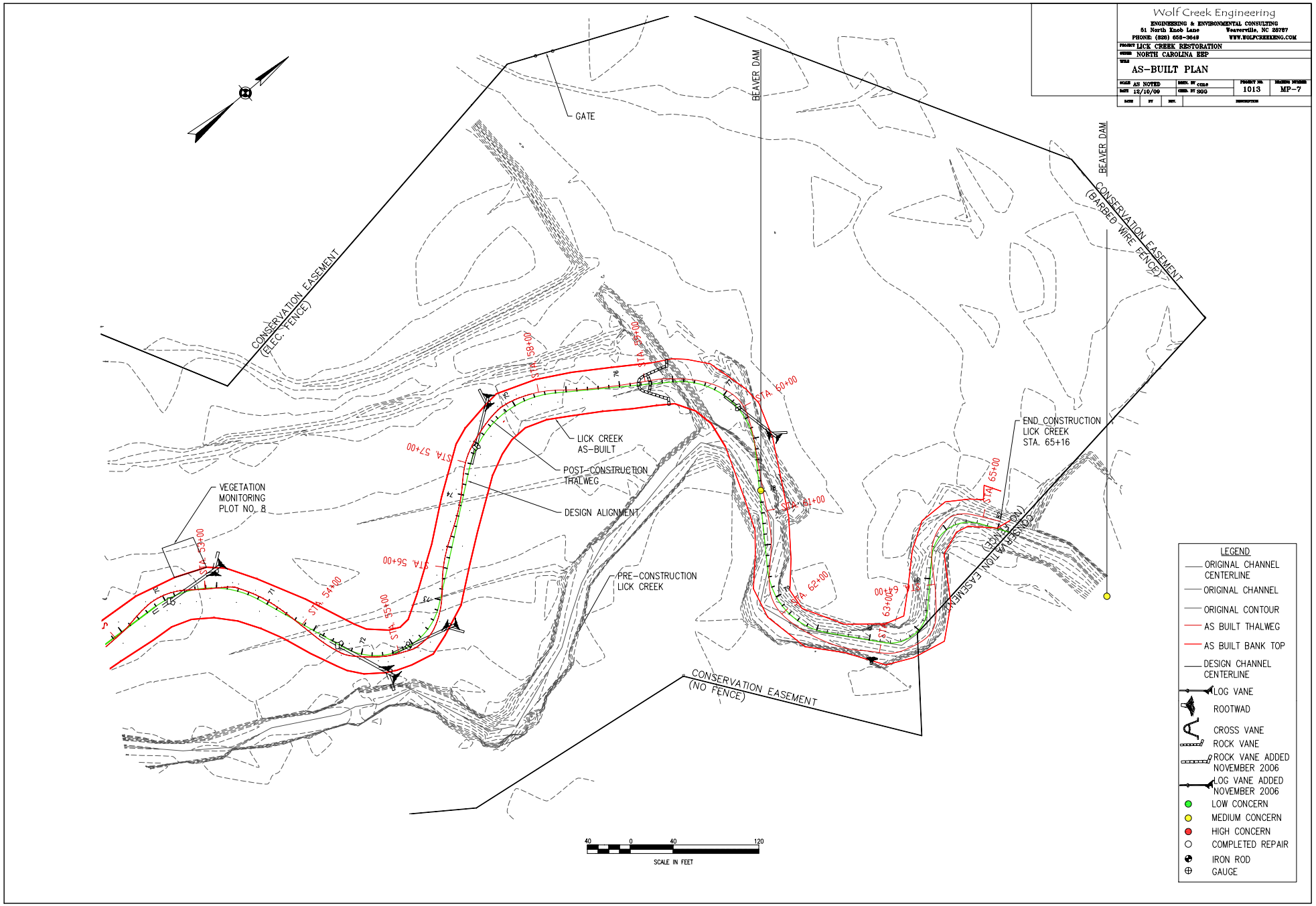
POINT DESCRIPTION	NORTHING	EASTING	ELEVATION
EP2LT	642782.85	1964742.86	211.95
EP2RT	642799.25	1964796.16	212.44
EP1LT	642771.53	1964579.57	212.07
EP1RT	642786.65	1964624.93	211.83
PP9	643372.57	1964974.33	211.30



POINT DESCRIPTION	NORTHING	EASTING	ELEVATION
BP3LT	643656.13	1965422.68	210.51
BP3RT	643623.83	1965476.86	210.50
PP5	643525.93	1965675.95	210.34
PP6	643581.04	1965808.22	210.05
XS5LT	643621.47	1965749.03	209.56
XS5RT	643566.26	1965790.05	210.22
XS6LT	643693.80	1965827.37	209.31
XS6RT	643667.29	1965893.12	210.12
EP3LT	643931.89	1966165.79	208.45
EP3RT	643905.52	1966239.12	208.06



POINT DESCRIPTION	NORTHING	EASTING	ELEVATION
EP3LT	643931.89	1966165.79	208.45
EP3RT	643905.52	1966239.12	208.06
PP8	643964.34	1966524.28	207.04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51 North Knob Lane
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PHONE: (828) 658-3649
WWW.WOLFCREEKENG.COM
PROJECT LICK CREEK RESTORATION
CLIENT NORTH CAROLINA EEP
TITLE AS-BUILT PLAN
SCALE AS NOTED
DATE 12/10/09
DESN. BY cms
CHKD. BY SGG
PROJECT NO. 1013
DRAWING NUMBER MP-7
GATE
BEAVER DAM
BEAVER DAM
CONSERVATION EASEMENT (ELEC. FENCE)
CONSERVATION EASEMENT (BARBED WIRE FENCE)
CONSERVATION EASEMENT (NO FENCE)
CONSERVATION EASEMENT (BARBED WIRE FENCE)
LICK CREEK AS-BUILT
POST-CONSTRUCTION THALWEG
DESIGN ALIGNMENT
PRE-CONSTRUCTION LICK CREEK
END CONSTRUCTION LICK CREEK STA. 65+16
VEGETATION MONITORING PLOT NO. 8
STA. 53+00
STA. 54+00
STA. 55+00
STA. 56+00
STA. 57+00
STA. 58+00
STA. 59+00
STA. 60+00
STA. 61+00
STA. 62+00
STA. 63+00
STA. 64+00
STA. 65+00
40 0 40 120
SCALE IN FEET
LEGEND
ORIGINAL CHANNEL CENTERLINE
ORIGINAL CHANNEL
ORIGINAL CONTOUR
AS BUILT THALWEG
AS BUILT BANK TOP
DESIGN CHANNEL CENTERLINE
LOG VANE
ROOTWAD
CROSS VANE
ROCK VANE
ROCK VANE ADDED NOVEMBER 2006
LOG VANE ADDED NOVEMBER 2006
LOW CONCERN
MEDIUM CONCERN
HIGH CONCERN
COMPLETED REPAIR
IRON ROD
GAUGE

2.0 PROJECT CONDITION AND MONITORING RESULTS

2.1 VEGETATION ASSESSMENT

The survivability of the riparian buffer plantings is evaluated using eight (8) randomly placed 10 meter by 10 meter vegetative sampling plots providing combined sample coverage of two percent of the replanted area. The corners of each monitoring plot have been marked in the field and their position documented by GPS survey. The monitoring consists of a physical inventory within each plot in order to determine the composition and number of surviving species and the total number of stems per acre. To the extent possible, differentiation between planted and volunteer stems was accomplished. The presence of non-native, exotic, and undesirable species was noted. Additionally, sequential photographs are taken from the upstream corner located closest to the stream of each monitoring plot.

Planted herbaceous species have successfully established throughout the majority of the site along with volunteer species from upstream seed sources. Due to favorable growing conditions during the fourth monitoring year, willow and dogwood live stakes used for bank stabilization have begun to establish themselves along the stream banks. The riparian buffer planting had an overall survival rate of 67% with additional volunteer species taking root.

2.1.1 Vegetative Problem

Cattle have had access to the upstream portion of Wallace Branch for what appears to be a prolonged period. During performance of the Year 4 monitoring survey, it was observed that an agricultural gate was open allowing unrestricted livestock access to the planted buffer adjacent to the agricultural ford crossing. Woody and herbaceous vegetation was severely impacted by over-grazing. The livestock were removed from the easement and the gate has been secured.

An increasing number of non-native Chinese privet (*Ligustrum sinense*) stems were recorded emerging in areas where invasive species removal previously occurred. A relatively high occurrence of privet was observed within the conservation easement along the upstream reach of Lick Creek, adjacent to a densely populated off-site stand of privet.

There are a few isolated areas where herbaceous species are only sparsely established on the floodplain and channel banks.

Table 5. Vegetative Problem Areas – Lick Creek Stream Restoration Site (D04013-1)

Feature / Issue	Station # / Range	Problem Cause
Invasive / Exotic Populations	Various	Several Chinese privet re-sprouting in areas where it was removed
Bare Bank or Toe	Wallace Branch 10+00 – 27+00, 42+50	Livestock grazing
	Lick Creek 49+90	Local scour

2.1.2 Stem Counts

Table 7 presents stem counts of surviving individuals found at each of the monitoring plot at the end of Year 4 of the post-construction monitoring period. Trees within each monitoring plot are flagged regularly to prevent the occurrence of unmarked trees due to flag degradation. Volunteer individuals found within the plots are also flagged during this process. The average stem density for the Site is 536 trees per acre and with an overall survival rate of 67%.

All herbaceous species seeded throughout the site after construction were found onsite at the end of Year 4. In addition, native species such as Switch grass (*Panicum virgatum*), soft rush (*Juncus effuses*), fennel (*Eupatorium* sp.), goldenrod (*Solidago* spp.), sedge (*Carex* spp.), buttercup (*Ranunculus* spp.), plantain (*Plantago* spp.), fescue (*Festucca* spp.), crabgrass (*Digitaria* spp.), smartweed (*Polygonum* spp.), nightshade (*Solanum* spp.), poison ivy (*Toxicodendron radicans*), *Rumex* spp., and species of Aster (*Aster* spp.), were found to have colonized throughout the project's riparian area.

Table 6. Stem Counts – Lick Creek Stream Restoration Site (D04013-1)

Species	Plots - Year 3								Initial Totals	Year 4 Totals
	1	2	3	4	5	6	7	8		
Trees										
Asimina triloba	1		1	2	1		1	1	27	7
Betula nigra	1	2	5+	1		4	3	2	10	21
Callicarpa americana	1	3	2		1				11	7
Cephalanthus occidentalis	1	1		5+	1	4			19	16
Corylus americana						2	3	3	17	8
Diospyros virginiana									6	0
Fraxinus pennsylvanica	1	1		2	1		1		6	6
Liriodendron tulipifera		1	1		1	1			6	4
Myrica cerifera	1	3	2	2	1	1	3	1	10	14
Nyssa sylvatica									2	0
Platanus occidentalis	1		2	2		1		2	7	8
Quercus michauxii	2			1	1	1		1	10	6
Quercus nigra			1		1				5	2
Quercus phellos			2			1	1		13	4
Ulmus Americana	3								14	3
Initial Totals:	**18**	**22**	**17**	**23**	**26**	**22**	**20**	**15**		
Year 3 Totals:	**12**	**11**	**19**	**19**	**8**	**15**	**12**	**10**	**Average Stem Survival %**	
Stem Survival %	**66.7**	**50**	**111.8**	**82.6**	**30.8**	**68.2**	**60**	**66.7**	**67.1**	
Density (trees/acre)	**486**	**445**	**769**	**769**	**324**	**607**	**486**	**405**	**536**	

2.1.3 Vegetation Plot Photos

A photo point was established in each vegetation plot. Photo points are positioned at the upstream plot corner located closest to the stream bank and oriented in order to capture the entire vegetation plot. The photographs were captured on the same day as the vegetation plot surveys (Appendix A).

2.2 STREAM ASSESSMENT

Monitoring protocol follows that outlined within the EEP Site Specific Mitigation Plan and detailed in the U.S. Army Corps of Engineers (USACE) Stream Mitigation Guidelines for Monitoring Level I. Specifically, stream monitoring included measurements of stream dimension, profile, pattern, bed materials, photo documentation, and stream bankfull return interval.

Most of the stream reaches have managed the extreme flow events of the first three years and repairs made in January, 2009 appear to be stable and in good condition. The bed profile appears to be stabilizing while bed material continues to coarsen. Bed material is beginning to refill scoured portions of the bed.

2.2.1 Hydrology

Since completion of construction in March of 2006, the site has been subjected to at least five greater-than-bankfull events and several near bankfull events. In June of 2006, Hurricane Alberto crossed central North Carolina resulting in five inches of rainfall on-site and water elevations three feet above bankfull on Reaches 1 and 2 and almost two feet above bankfull on Reach 3. Additionally, Lower Moncure Road was overtopped by Wallace Branch. It is estimated that this storm was approximately a fifty-year event. In November of 2006, heavy rainfall resulted in water elevations up to two feet above bankfull. The severity of this storm resulted in a malfunction of the rain gauge so that the quantity of rainfall was not recorded. Heavy rainfall associated with remnants of Tropical Storm Fay and Hurricane Hannah produced two more events in August and September of 2008 which resulted in water elevations one to three feet above bankfull. Another bankfull event occurred during the summer of 2009 due to locally heavy rainfall. Five additional events including Hurricane Ernesto resulted in water elevations within one to two feet below bankfull.

Table 7. Verification of Bankfull Events – Lick Creek Stream Restoration Site (D04013-1)

Date of Data Collection	Date of Occurrence of Bankfull Event	Method of Data Collection
7/24/06	6/14/06	Crest Gauge and Pressure Transducer
12/1/06	11/22/06	Crest Gauge and Pressure Transducer
11/27/07	10/27/07	Crest Gauge
10/24/08	Summer ‘08	Crest Gauge
10/26/09	Summer ‘09	Consistent Debris Lines & Crest Gauge

2.2.2 Geomorphology

Following the procedures established in the USDA Forest Service Manual (Harrelson et al 1994) and the methodologies utilized in the Rosgen stream assessment and classification system (Rosgen 1994, 1996), data collected consisted of detailed dimension and pattern measurements, longitudinal profiles, and bed materials sampling.

Re-survey of the permanent cross sections and profile reaches have shown some alterations in local bed elevations with the bed form and the channel pattern remaining consistent with the Year 3 condition. The riffle in monitoring Reach 1 shows nearly the same dimensions as Year 3. The riffle in monitoring Reach 2 is slightly lower than the Year 3 bed elevation, while the riffle in monitoring Reach 3 has slightly aggraded. However, inspection of the riffle profiles immediately downstream of these sections indicates that the riffle grade is stable. The pools were generally found to be deeper than the Year 3 condition which is probably related to the increase bank vegetation found throughout the Site and subsequent reduction in erosion. The pool locations relative to the pattern are consistent with previous surveys.

Pebble counts were conducted at each cross-section, as well as across the overall study reach. Pebble count data was plotted by size distribution in order to assess the D_{50} and D_{84} size class. In Reach 1, the material size decreased slightly from the third year survey with the D_{84} decreasing from 11 mm to 10 mm, the D_{50} decreasing from 1.4mm to 0.1mm, and the percent of gravel decreased from 46% to 36%. In Reach 2, the D_{84} decreased in size from 18 mm to 11 mm, the D_{50} decreased from 6.6mm to 1.4mm, and the percent of gravel decreased from 69% to 45%. In Reach 3 the D_{84} decreased from 15mm to 12 mm, the D_{50} increased from 1.8mm to 4.2mm, and percent of gravel decreased from 59% to 54%. Given the slight changes in absolute particle size, these variations could be due to the sampling techniques of the monitoring observers or the result of sediment pulses migrating through the Site.

Table 8. BEHI and Sediment Export Estimates – (Not Required in Year 4)

2.2.3 Problem Areas

The Year 3 monitoring report identified several problem areas as part of the stream assessment. Of these areas, thirteen (13) are no longer areas of concern as they have been repaired and six (6) have stabilized through natural channel process or vegetation growth. However, livestock access and beaver activity have resulted in new areas of concern. Livestock access at the upstream end of Wallace Branch resulted in severe impacts to riparian buffer vegetation and there are several locations where cattle directly impacted the channel banks. At the lower end of Lick Creek, two beaver dams have been constructed, one at Sta. 61+00 and one immediately downstream of the Site which were creating backwater within the channel banks on approximately 800 ft. of the site. The dam at Sta 61+00 has since been removed and the area will be monitored for beaver activity.

Plan drawings of the Lick Creek Stream Restoration Site detailing stream problem areas requiring additional observation and/or remediation can be seen in Figures MP-1 through

MP-7. Representative photos of these areas can be found in Appendix B. Restoration Systems will monitor these areas over the next several months and will take remedial actions as necessary.

Table 9. Problem Areas – Lick Creek Stream Restoration Site (D04013-1)

Location	Issue	Status	Recommended Response
Wallace Branch			
11+50	Bed Scour	No Change	Continued Observation
12+00 - 15+00	Cattle Impacts	Veg and Bank Impacts	Secure Easement
16+60	Bed Scour	No Change	Continued Observation
18+70	Veg in Riffle	No Change	Continued Observation
29+50	LV Piping/Toe Scour	Repaired/Stable	
40+80	Bank Erosion	Repaired/Stable	
42+40	Bed & Bank Scour	Repaired/Stable	Additional seeding
43+50	LV Piping/Toe Scour	Repaired/Stable	
43+90	Bed Scour	No Change	Continued Observation
46+20	Bare Bank	Veg has stabilized	
Lick Creek			
10+00	Bank Scour	Repaired/Stable	
10+90	Log Vane Piping	No Change	Continued Observation
14+50	Toe Scour	Repaired/Stable	
15+60	Bank Scour	Repaired/Stable	
16+10	Bed Scour	Same	Continued Observation
17+00	Toe and Bank Scour	Repaired/Stable	
18+00	Bed Scour	Material Coarsening	Continued Observation
18+50	Structure Piping	Repaired/Stable	
19+20	Mid-Channel Bar	Healed	
21+30	Toe Scour	Healed	
23+10	Bed & Bank Scour	Repaired/Stable	
24+40	Toe Scour	Repaired/Stable	
27+50	Bank Scour	Repaired/Stable	
32+00 - 37+00	Bank and Toe Scour	Repaired/Stable	Additional seeding
38+70	Bank Erosion	Veg Coming In	
39+00	Toe Scour	Repaired/Stable	
40+20	Toe Scour	No Change	Continued Observation
41+80	Bare Bank	Veg Coming In	
44+90	Mid-Channel Bar	No Change	Continued Observation
47+40	Toe Scour	Veg Coming In	
49+80	Bare Bank		Additional seeding
54+75	Str. And Bank Scour	Repaired/Stable	
61+00	Beaver Dam		Continued Observation

2.2.4 Photo Reference Stations

Photograph reference Stations (PRSs) have been established to assist in characterizing the site and to allow qualitative evaluation of the site conditions. The location of each photo station has been permanently marked in the field and the bearing/orientation of the photograph is indicated on the As-built plans to allow for consistent repetition. A total of eleven (11) PRSs have been established along the restored stream (Appendix B). Six of these PRSs have been located upstream of the permanent monitoring cross sections. These photographs are taken facing downstream looking at the section, and show as much of the banks and channel as possible.

2.2.5 Stability Assessment Table

	Performance Percentage Reach 1: Wallace Branch (3,690 ft)					
Feature	**Initial**	**MY-01**	**MY-02**	**MY-03**	**MY-04**	**MY-05**
Riffles	100%	100%	100%	100%	100%	
Pools	100%	100%	100%	100%	100%	
Thalweg	100%	100%	100%	100%	100%	
Meanders	100%	99%	99%	95%	95%	
Bed General	100%	98%	98%	99%	100%	
Vanes / J Hooks etc.	100%	94%	94%	96%	100%	
Wads and Boulders	100%	100%	100%	100%	100%	

	Performance Percentage Reach 2: Lick Creek (1,870 ft)					
Feature	**Initial**	**MY-01**	**MY-02**	**MY-03**	**MY-04**	**MY-05**
Riffles	100%	89%	95%	82%	89%	
Pools	100%	82%	91%	91%	91%	
Thalweg	100%	100%	100%	100%	100%	
Meanders	100%	100%	98%	82%	100%	
Bed General	100%	97%	98%	98%	100%	
Vanes / J Hooks etc.	100%	96%	96%	90%	98%	
Wads and Boulders	100%	100%	100%	100%	100%	

Feature	Performance Percentage Reach 3: Lick Creek (4,008 ft)					
	Initial	MY-01	MY-02	MY-03	MY-04	MY-05
Riffles	100%	98%	98%	96%	99%	
Pools	100%	100%	100%	100%	100%	
Thalweg	100%	100%	100%	100%	100%	
Meanders	100%	100%	100%	96%	100%	
Bed General	100%	100%	100%	99%	100%	
Vanes / J Hooks etc.	100%	95%	97%	96%	100%	
Wads and Boulders	100%	97%	99%	100%	100%	

2.2.6 Quantitative Measure Summary Tables

The following three tables provide a summary of the morphologic parameters over the four years of monitoring (Year 1 through Year 4).

Morphology and Hydraulic Monitoring Summary
Lick Creek Stream Restoration Site (D04013-1)
Reach 1: Wallace Branch

Parameter	Cross Section 1 Riffle						Cross Section 2 Pool						Cross Section					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
Bkf Width (ft)	27	27	27.3	27.3			25.7	26.2	26.2	29.8								
Floodprone Width (ft)	>100	>100	>100	>100														
Bkf Cross Sectional Area (ft^2)	63.8	62.7	64.2	64.2			72.3	83.5	88.1	91.6								
Bkf Mean Depth (ft)	2.4	2.3	2.3	2.4			2.8	3.2	3.4	3.1								
Bkf Max Depth (ft)	4.3	4.4	4.3	4.3			5.2	5.9	6.1	6.3								
Width/Depth Ratio	11.4	11.6	11.6	11.6														
Entrenchment Ratio	>3	>3	>3	>3														
Wetted Perimeter (ft)																		
Hydraulic Radius (ft)																		
Substrate																		
D_{50} (mm)	0.1	1.2	1.4	0.1														
D_{84} (mm)	2	10	12	10														

Parameter	MY-1 (2006)			MY-2 (2007)			MY-3 (2008)			MY-4 (2009)			MY-5 (2010)			MY+ (2011)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Beltwidth (ft)	110	130	120	110	130	120	110	130	120	110	130	120						
Radius of Curvature (ft)	48	60	54	48	60	54	48	60	54	48	60	54						
Meander Wavelength (ft)	200	260	230	200	260	230	200	260	230	200	260	230						
Profile																		
Riffle Length (ft)	54	77	65.5	38	65	52	30	75	53	33	83	63						
Riffle Slope (%)	0.09	0.4	0.245	0.13	0.45	0.29	0.07	0.881	0.48	0.13	0.55	0.42						
Pool length (ft)	40	68	54	42	56	49	30	82	56	39	63	50						
Pool Spacing (ft)	128	157	142.5	134	149	142	130	144	137	153	155	154						
Additional Reach Parameters																		
Valley Length (ft)	774		774	774		774	774		774			774						
Channel Length (ft)	1010		1010	1010		1010	1010		1010			1010						
Sinuosity	1.3		1.3	1.3		1.3	1.3		1.3			1.3						
Water Surface Slope (%)	0.17		0.17	0.16		0.16	0.15		0.15			0.17						
Bkf Slope (%)	0.17		0.17	0.16		0.16	0.15		0.15			0.12						
Rosgen Classification	E5			E5			E5					E5						
Habitat Index																		
Macrobenthos																		

Morphology and Hydraulic Monitoring Summary
Lick Creek Stream Restoration Site (D04013-1)
Reach 2: Lick Creek

Parameter	Cross Section 3 Riffle						Cross Section 4 Pool						Cross Section					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
Bkf Width (ft)	27	26.4	26.4	29.6			38.1	36	36	36								
Floodprone Width (ft)	>100	>100	>100	>100														
Bkf Cross Sectional Area (ft^2)	68	69.8	69.4	75.4			109.7	102.9	96.2	100								
Bkf Mean Depth (ft)	2.5	2.6	2.6	2.5			2.9	2.9	2.7	2.8								
Bkf Max Depth (ft)	4.5	4.5	4.8	5.2			5.7	5.4	4.9	5.9								
Width/Depth Ratio	10.7	10	10	11.6														
Entrenchment Ratio	>3	>3	>3	>3														
Wetted Perimeter (ft)																		
Hydraulic Radius (ft)																		
Substrate																		
D_{50} (mm)	0.7	0.8	6.6	1.4														
D_{84} (mm)	6	7	16	11														

Parameter	MY-1 (2006)			MY-2 (2007)			MY-3 (2008)			MY-4 (2009)			MY-5 (2010)			MY+ (2011)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Beltwidth (ft)	120	150	135	120	150	135	120	150	135	120	150	135						
Radius of Curvature (ft)	50	90	70	50	90	70	50	90	70	50	90	70						
Meander Wavelength (ft)	260	290	275	260	290	275	260	290	275	260	290	275						
Profile																		
Riffle Length (ft)	86	142	114	80	100	90	60	88	74	46	73	67						
Riffle Slope (%)	0.19	0.26	0.225	0.2	0.47	0.34	0.03	0.437	0.23	0.11	0.4	0.16						
Pool length (ft)	28	75	51.5	32	80	56	30	82	56	13	60	28						
Pool Spacing (ft)	180	250	215	152	220	186	157	284	220	138	284	202						
Additional Reach Parameters																		
Valley Length (ft)	810		810	810		810	810		810			810						
Channel Length (ft)	1041		1041	1041		1041	1041		1041			1041						
Sinuosity	1.3		1.3	1.3		1.3	1.3		1.3			1.3						
Water Surface Slope (%)	0.298		0.298	0.31		0.31	0.27		0.27			0.24						
Bkf Slope (%)	0.298		0.298	0.31		0.31	0.27		0.27			0.25						
Rosgen Classification	E5			E5			E5					E5						
Habitat Index																		
Macrobenthos																		

Morphology and Hydraulic Monitoring Summary
Lick Creek Stream Restoration Site (D04013-1)
Reach 3: Lick Creek

Parameter	Cross Section 5 Riffle						Cross Section 6 Pool						Cross Section					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
Bkf Width (ft)	43.4	44.5	44.5	44.3			45	43	42.7	43								
Floodprone Width (ft)	>150	>150	>150	>150														
Bkf Cross Sectional Area (ft^2)	162.1	160.2	164	146.8			164.1	170.9	172.4	186.1								
Bkf Mean Depth (ft)	3.7	3.6	3.7	3.3			3.6	4	4	4.3								
Bkf Max Depth (ft)	6.8	7	8.3	8			7.8	8.3	7.7	9.6								
Width/Depth Ratio	11.6	12.4	12.1	13.4														
Entrenchment Ratio	>3	>3	>3	>3														
Wetted Perimeter (ft)																		
Hydraulic Radius (ft)																		
Substrate																		
D_{50} (mm)	0.8	0.4	1.8	4.2														
D_{84} (mm)	13	8	15	12														

Parameter	MY-1 (2006)			MY-2 (2007)			MY-3 (2008)			MY-4 (2009)			MY-5 (2010)			MY+ (2011)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Beltwidth (ft)	180	250	215	180	250	215	180	250	215	180	250	215						
Radius of Curvature (ft)	70	100	85	70	100	85	70	100	85	70	100	85						
Meander Wavelength (ft)	300	340	320	300	340	320	300	340	320	300	340	320						
Profile																		
Riffle Length (ft)	93	138	115.5	69	104	87	78	90	84	75	130	78						
Riffle Slope (%)	0.062	0.145	0.104	0.14	0.53	0.33	0.051	0.367	0.209	0.11	0.31	0.21						
Pool length (ft)	47	110	78.5	80	112	96	45	91	68	16	43	23						
Pool Spacing (ft)	200	240	220	180	265	223	195	223	209	187	278	214						
Additional Reach Parameters																		
Valley Length (ft)	794		794	794		794	794		794			794						
Channel Length (ft)	1167		1167	1167		1167	1167		1167			1167						
Sinuosity	1.5		1.5	1.5		1.5	1.5		1.5			1.5						
Water Surface Slope (%)	0.16		0.16	0.13		0.13	0.13		0.13			0.13						
Bkf Slope (%)	0.16		0.16	0.13		0.13	0.13		0.13			0.45						
Rosgen Classification	E5			E5			E5					E5						
Habitat Index																		
Macrobenthos																		

APPENDIX A

1. Vegetation Monitoring Plot Photos

Vegetation Plot No. 1

Year 3 Photo No. 1

Year 4 Photo No. 2

Vegetation Plot No. 2

Year 3 Photo No. 3

Year 4 Photo No. 4

Vegetation Plot No. 3

Year 3 Photo No. 5

Year 4 Photo No. 6

Vegetation Plot No. 4

Year 2 Photo No. 7

Year 4 Photo No. 8

Vegetation Plot No. 5

Year 3 Photo No. 9

Year 4 Photo No. 10

Vegetation Plot No. 6

Year 3 Photo No. 11

Year 4 Photo No. 12

Vegetation Plot No. 7

Year 3 Photo No. 13

Year 4 Photo No. 14

Vegetation Plot No. 8

Year 3 Photo No. 15

Year 4 Photo No. 16

APPENDIX B

Stream Raw Data

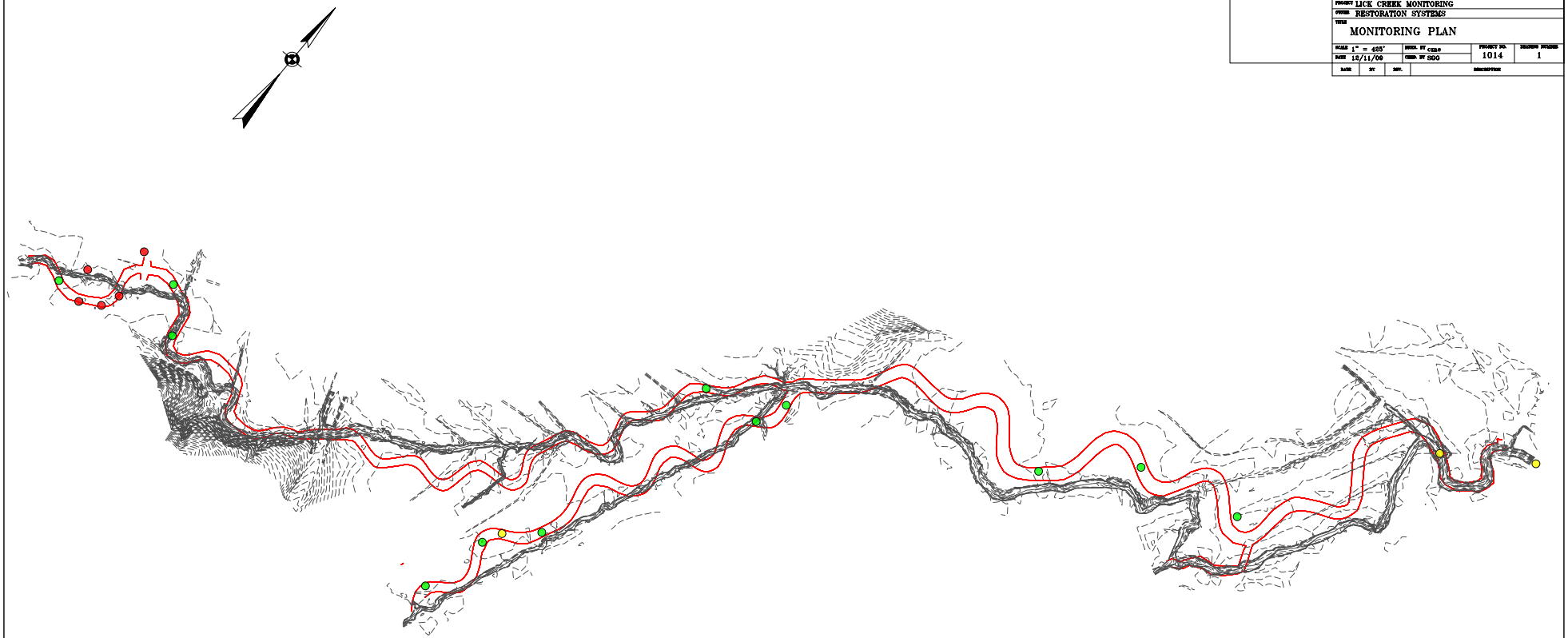
1. Exhibit Problem Areas Plan View (Stream)
2. Representative Stream Problem Area Photos
3. Stream Photo-points
4. Exhibit Table B.1. Qualitative Visual Stability Assessment
5. Cross section Plots and Raw Data Tables
6. Longitudinal Plots and Raw Data Tables
7. Pebble Count Plots and Raw Data Tables

ENGINEERING & ENVIRONMENTAL CONSULTING
51 North Knob Lane Weaverville, NC 28787
PHONE: (828) 658-3649 WWW.WOLFCREEKENG.COM

PROJECT: LICK CREEK MONITORING
OWNER: RESTORATION SYSTEMS
TITLE: MONITORING PLAN

SCALE	DESIGN BY	PROJECT NO.	DRAWING NUMBER
1" = 425'	CMS	1014	1
DATE 12/11/09	CHKD BY SGG		

DATE	BY	REV.	DESCRIPTION



LEGEND

- AS BUILT BANK TOP
- LOW CONCERN
- MEDIUM CONCERN
- HIGH CONCERN

Projects\1014-LICK\MXD\1014-MONITORING SITE PLAN.MXD

Bank Erosion at Wallace Branch, Sta 13+90 10/26/09

Photo No. 17

Toe Scour at Lick Creek, Sta 40+25 10/26/09

Photo No. 18

Formation of Mid-Channel Bar on Lick Creek, Sta 44+90 10/26/09

Photo No. 19

Weak Bank Vegetation on Wallace Branch, Sta 42+40 10/26/09

Photo No. 20

Cattle Access on Wallace Branch, Sta 15+50 10/26/09

Photo No. 21

Banks Impacted by Cattle on Wallace Branch, Sta 14+30 10/26/09

Photo No. 22

Banks Impacted by Cattle on Wallace Branch, Sta 12+30 10/26/09

Photo No. 23

Beaver Dam on Lick Creek, Sta 61+00 10/26/09

Photo No. 24

Photo Station 1

Year 2 - 10’ offset from PP1 Photo No. 25

3 - 25’ offset from PP1 Photo No. 26

Year 4 - 25’ offset from PP1 Photo No. 27

Photo Station 2

Year 2 - 10’ offset from PP2 Photo No. 28

Year 3 - 10’ offset from PP2 Photo No. 29

Year 4 - 10’ offset from PP2 Photo No. 30

Photo Station 3

Year 3 - 10’ offset from PP3 Photo No. 31

Year 3 - 10’ offset from PP3 Photo No. 32

Year 4 - 10’ offset from PP3 Photo No. 33

Photo Station 4

Year 2 - 10’ offset from PP4 Photo No. 34

Year 3 - 10’ offset from PP4 Photo No. 35

Year 4 - 10’ offset from PP4 Photo No. 36

Photo Station 5

Year 2 - 10’ offset from PP5 Photo No. 37

Year 3 - 10’ offset from PP5 Photo No. 38

Year 4 - 10’ offset from PP5 Photo No. 39

Photo Station 6

Year 2 - 10’ offset from PP6 Photo No. 40

Year 3 - 10’ offset from PP6 Photo No. 41

Year 4 - 10’ offset from PP6 Photo No. 42

Photo Station 7

Year 2 Photo No. 43

Year 3 Photo No. 44

Year 4 – 10’ offset from PP7 Photo No. 45

Photo Station 8

Year 2 Photo No. 46

Year 3 - 10’ offset from PP8 Photo No. 47

Year 4 - 10’ offset from PP8 Photo No. 48

Photo Station 9

Year 2 - 10’ offset from PP9 Photo No. 49

Year 3 - 10’ offset from PP9 Photo No. 50

Year 4 - 10’ offset from PP9 Photo No. 51

Photo Station 10

Year 2 Photo No. 52

Year 3 Photo No. 53

Year 4 Photo No. 54

Photo Station 11

Year 2 - 10’ offset from PP11 Photo No. 55

Year 3 - 10’ offset from PP11 Photo No. 56

Year 4 - 10’ offset from PP11 Photo No. 57

Table B1. Visual Morphological Stability Assessment

Lick Creek Stream Restoration Site (D04013-1)

Wallace Branch: Reach 1 3,690 ft

Feature Category	Metric	(# Stable) Number Performing as Intended	Total Number per As-built	Total Number / feet in unstable state	% Performing in Stable Condition	Feature Performing Mean or Total
A. Riffles	1. Present	25	25	N/A	100%	
	2. Armor stable	1	1	N/A	100%	
	3. Facet grade appears stable	25	25	N/A	100%	
	4. Minimal evidence of embedding/fining	25	25	N/A	100%	
	5. Length appropriate	25	25	N/A	100%	**100%**
B. Pools	1. Present	26	26	N/A	100%	
	2. Sufficently deep	26	26	N/A	100%	
	3. Length appropriate	26	26	N/A	100%	**100%**
C. Thalweg	1. Upstream of meander bend centered	13	13	N/A	100%	
	2. Downstream of meander bend centered	13	13	N/A	100%	**100%**
D. Meanders	1. Outer bend in state of limited erosion	25	26	N/A	96%	
	2. Of those eroding, # w/ concomitant point bar formation	0	N/A	N/A	88%	
	3. Apparent Rc within specification	26	26	N/A	100%	
	4. Sufficient floodplain access and relief	25	26	N/A	96%	**95%**
E. Bed General	1. General channel bed agradation areas	N/A	N/A	0/50	100%	
	2. Channel bed degradation - areas of increasing down-cutting or head-cutting	N/A	N/A	0/100	100%	**100%**
F. Vanes	1. Free of back or arm scour	17	17	N/A	100%	
	2. Height appropriate	17	17	N/A	100%	
	3. Angle and geometry appear appropriate	17	17	N/A	100%	
	4. Free of piping or other structural failures	17	17	N/A	100%	**100%**
G. Wads/Boulders	1. Free of scour	33	33	N/A	100%	
	2. Footing stable	33	33	N/A	100%	**100%**

Table B1. Visual Morphological Stability Assessment

Lick Creek Stream Restoration Site (D04013-1)

Lick Creek: Reach 2 1,870 ft

Feature Category	Metric	(# Stable) Number Performing as Intended	Total Number per As-built	Total Number / feet in unstable state	% Performing in Stable Condition	Feature Performing Mean or Total
A. Riffles	1. Present	9	11	N/A	82%	
	2. Armor stable	2	2	N/A	100%	
	3. Facet grade appears stable	9	11	N/A	82%	
	4. Minimal evidence of embedding/fining	11	11	N/A	100%	
	5. Length appropriate	9	11	N/A	82%	**89%**
B. Pools	1. Present	10	11	N/A	91%	
	2. Sufficently deep	10	11	N/A	91%	
	3. Length appropriate	10	11	N/A	91%	**91%**
C. Thalweg	1. Upstream of meander bend centered	5	5	N/A	100%	
	2. Downstream of meander bend centered	6	6	N/A	100%	**100%**
D. Meanders	1. Outer bend in state of limited erosion	11	11	N/A	100%	
	2. Of those eroding, # w/ concomitant point bar formation	0	N/A	N/A	100%	
	3. Apparent Rc within specification	11	11	N/A	100%	
	4. Sufficient floodplain access and relief	11	11	N/A	100%	**100%**
E. Bed General	1. General channel bed agradation areas	N/A	N/A	0/40	100%	
	2. Channel bed degradation - areas of increasing down-cutting or head-cutting	N/A	N/A	0/60	100%	**100%**
F. Vanes	1. Free of back or arm scour	13	13	N/A	100%	
	2. Height appropriate	13	13	N/A	100%	
	3. Angle and geometry appear appropriate	13	13	N/A	100%	
	4. Free of piping or other structural failures	12	13	N/A	92%	**98%**
G. Wads/Boulders	1. Free of scour	22	22	N/A	100%	
	2. Footing stable	22	22	N/A	100%	**100%**

Table B1. Visual Morphological Stability Assessment

Lick Creek Stream Restoration Site (D04013-1)

Lick Creek: Reach 3 4,008 ft

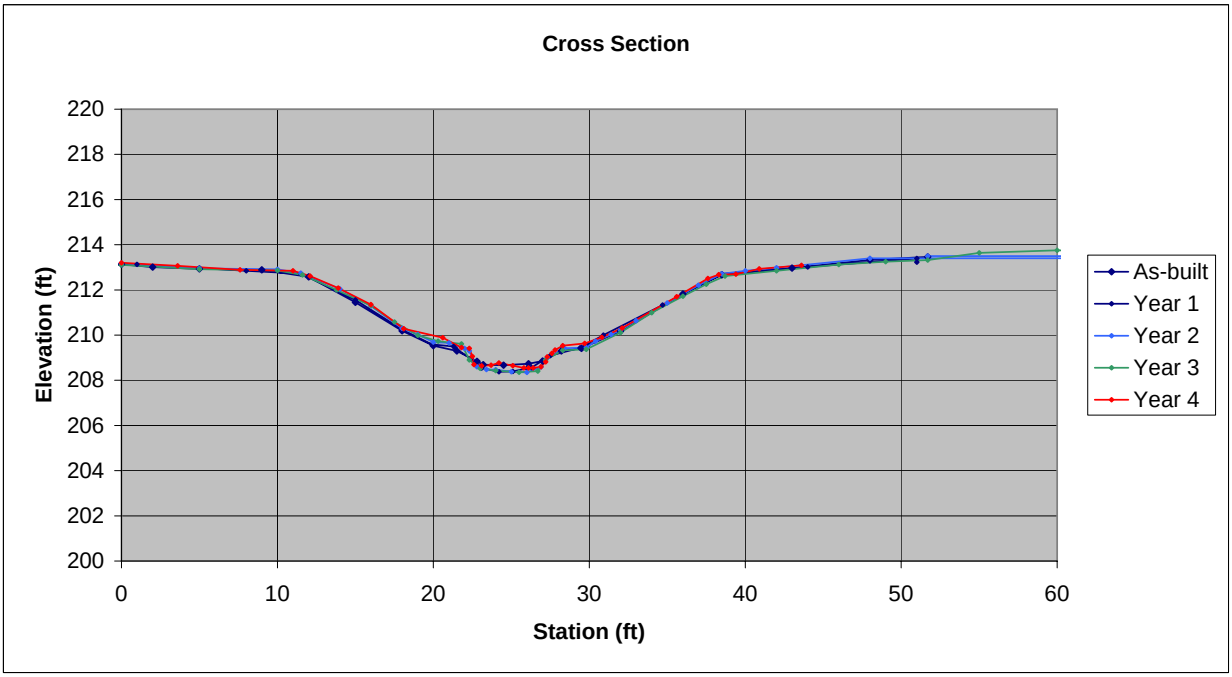
Feature Category	Metric	(# Stable) Number Performing as Intended	Total Number per As-built	Total Number / feet in unstable state	% Performing in Stable Condition	Feature Performing Mean or Total
A. Riffles	1. Present	16	17	N/A	94%	
	2. Armor stable	1	1	N/A	100%	
	3. Facet grade appears stable	17	17	N/A	100%	
	4. Minimal evidence of embedding/fining	17	17	N/A	100%	
	5. Length appropriate	17	17	N/A	100%	**99%**
B. Pools	1. Present	18	18	N/A	100%	
	2. Sufficently deep	18	18	N/A	100%	
	3. Length appropriate	18	18	N/A	100%	**100%**
C. Thalweg	1. Upstream of meander bend centered	9	9	N/A	100%	
	2. Downstream of meander bend centered	9	9	N/A	100%	**100%**
D. Meanders	1. Outer bend in state of limited erosion	18	18	N/A	100%	
	2. Of those eroding, # w/ concomitant point bar formation	0	N/A	N/A	100%	
	3. Apparent Rc within specification	18	18	N/A	100%	
	4. Sufficient floodplain access and relief	18	18	N/A	100%	**100%**
E. Bed General	1. General channel bed agradation areas	N/A	N/A	0/50	100%	
	2. Channel bed degradation - areas of increasing down-cutting or head-cutting	N/A	N/A	0/5	100%	**100%**
F. Vanes	1. Free of back or arm scour	30	30	N/A	100%	
	2. Height appropriate	30	30	N/A	100%	
	3. Angle and geometry appear appropriate	30	30	N/A	100%	
	4. Free of piping or other structural failures	30	30	N/A	100%	**100%**
G. Wads/Boulders	1. Free of scour	35	35	N/A	100%	
	2. Footing stable	36	36	N/A	100%	**100%**

Lick Creek Stream Restoration Site
Lee County, NC
Cross Section No. 1
Reach 1 - Wallace Branch - Sta 12+85

Year 3

Year 4

Facing Downstream



As-Built		Year 1		Year 2		Year 3		Year 4		Year 5	
Date	5/4/06	Date	11/17/06	Date	11/26/07	Date	10/23/08	Date	10/26/09	Date	0/0/0
Area	60.5	Area	63.8	Area	62.7	Area	64.2	Area	64.2	Area	0.0
Bkf W	26.5	Bkf W	27	Bkf W	27	Bkf W	27.3	Bkf W	27.3	Bkf W	10
Dmean	2.3	Dmean	2.4	Dmean	2.3	Dmean	2.3	Dmean	2.4	Dmean	0.0
Dmax	3.9	Dmax	4.3	Dmax	4.4	Dmax	4.3	Dmax	4.3	Dmax	0.0
W/d	11.6	W/d	11.4	W/d	11.6	W/d	11.6	W/d	11.6	W/d	0.0

Lick Creek Stream Restoration Site
Lee County, NC
Cross Section No. 1
Reach 1 - Wallace Branch - Sta 12+85

As-Built

Station	FS/BS	Elev.	Desc.
BM	4.65	213.24	IR Lt
HI		217.89	
0	4.75	213.14	GRND
2	4.88	213.01	
5	4.96	212.93	
9	5.00	212.89	
12	5.31	212.58	TOB
15	6.44	211.45	
18	7.70	210.19	
20	8.36	209.53	
21.5	8.59	209.30	
22.8	9.05	208.84	EOW
23.2	9.20	208.69	
24.5	9.22	208.67	
26.1	9.16	208.73	
27	9.04	208.85	EOW
28.2	8.59	209.30	
29.5	8.48	209.41	
32	7.71	210.18	
36	6.07	211.82	HW
38.5	5.22	212.67	TOB
43	4.92	212.97	
48	4.56	213.33	
51.7	4.43	213.46	IP

Year 1

Station	FS/BS	Elev.	Desc.
BM	5.54	213.24	IR Lt
HI		218.78	
1	5.65	213.13	
8	5.93	212.85	ToB
11.5	6.06	212.72	BKF
15	7.22	211.56	
18	8.53	210.25	
19.9	9.19	209.59	
21.3	9.28	209.50	LEW
21.4	9.36	209.42	
22.4	9.82	208.96	TOE
23.1	10.24	208.54	
24.2	10.40	208.38	
25.1	10.39	208.39	
26	10.25	208.53	TOE
26.3	10.22	208.56	
27.5	9.69	209.09	REW
29.4	9.35	209.43	
30.9	8.78	210.00	BKF
34.7	7.45	211.33	ToB
38.5	6.07	212.71	
44	5.76	213.02	
51	5.39	213.39	IR Rt
51	5.55	213.23	

Year 2

Station	FS/BS	Elev.	Desc.
BM	5.01	213.24	IR Lt
HI		218.25	
0	5.07	213.18	
5	5.30	212.95	
10	5.34	212.91	
11.5	5.51	212.74	
14	6.20	212.05	
16	6.96	211.29	
18	7.95	210.30	
19	8.22	210.03	
20	8.56	209.69	
21	8.60	209.65	
22	8.84	209.41	
22.3	8.95	209.30	
22.8	9.65	208.60	EOW
23.4	9.77	208.48	
24	9.78	208.47	
25	9.87	208.38	
26	9.90	208.35	
26.9	9.66	208.59	EOW
27.3	9.25	209.00	
28.4	8.83	209.42	
29.8	8.80	209.45	
30.4	8.52	209.73	
31.4	8.22	210.03	
32	8.03	210.22	
33	7.61	210.64	
35	6.83	211.42	
37	6.04	212.21	
38.5	5.54	212.71	
40	5.40	212.85	
42	5.27	212.98	
48	4.85	213.40	
5136	4.80	213.45	
51.7	4.75	213.50	IR Rt

Year 3

Station	FS/BS	Elev.	Desc.
BM	5.02	213.71	IR Lt
HI		218.73	
-20	6.05	212.68	
-10	5.94	212.79	
0	5.62	213.11	GRND
5	5.81	212.92	
10	5.87	212.86	TOB
11.6	6.07	212.66	
13.8	6.73	212.00	
16	7.43	211.30	
17.5	8.15	210.58	
19	8.74	209.99	
20.3	9	209.73	
21.8	9.12	209.61	
22.3	9.83	208.90	EOW
23	10.2	208.53	
24	10.3	208.43	
25.5	10.37	208.36	
26.7	10.32	208.41	
27.2	9.83	208.90	EOW
28.3	9.4	209.33	
29.8	9.36	209.37	
32	8.62	210.11	
34	7.74	210.99	
36	7.01	211.72	
37.5	6.48	212.25	
38.7	6.12	212.61	
42	5.88	212.85	TOB
46	5.61	213.12	
49	5.48	213.25	
51.7	5.41	213.32	GRND
55	5.09	213.64	
60	4.98	213.75	
70	5.16	213.57	

Year 4

Station	FS/BS	Elev.	Desc.
BM	4.87	213.24	XS-1 IR Lt
HI		218.11	
0	4.91	213.20	GRND
3.6	5.04	213.07	GRND
7.6	5.22	212.89	GRND
11	5.26	212.85	GRND
12.1	5.50	212.61	BKF
13.9	6.03	212.08	BNK
16	6.76	211.35	BNK
18.1	7.83	210.28	BNK
20.6	8.22	209.89	BNK
21.8	8.66	209.45	BNK
22.3	8.70	209.41	BNK
22.5	9.05	209.06	EOW
22.6	9.41	208.70	BED
23.1	9.47	208.64	BED
23.7	9.44	208.67	BED
24.2	9.34	208.77	BED
25.1	9.46	208.65	BED
25.8	9.56	208.55	BED
26.1	9.56	208.55	BED
26.4	9.56	208.55	BED
26.9	9.51	208.60	BED
27.2	9.29	208.82	BED
27.3	9.07	209.04	EOW
27.6	8.92	209.19	BNK
27.8	8.77	209.34	BNK
28.3	8.58	209.53	BNK
29.7	8.48	209.63	BNK
30.8	8.21	209.90	BNK
32.1	7.8	210.31	BNK
35.6	6.41	211.70	BNK
37.6	5.6	212.51	BNK
38.3	5.43	212.68	BKF
39.4	5.41	212.70	GRND
40.9	5.18	212.93	GRND
43.6	5.02	213.09	GRND
47.6	4.72	213.39	GRND
51.6	4.66	213.45	GRND

Year 5

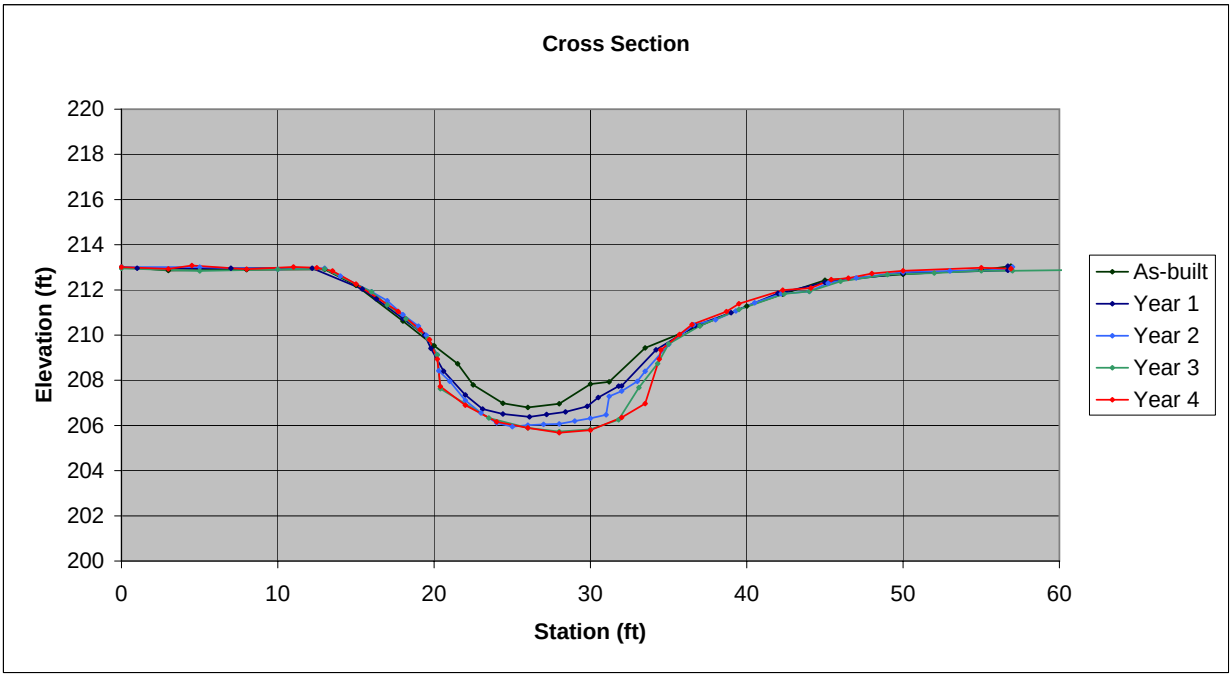
Station	FS/BS	Elev.	Desc.
BM	0.00	100.00	IR Lt
HI		100.00	

Lick Creek Stream Restoration Site
Lee County, NC
Cross Section No. 2 - Pool
Reach 1 - Wallace Branch - Sta 13+78

Year 3

Year 4

Facing Downstream



As-Built		Year 1		Year 2		Year 3		Year 4		Year 5	
Date	5/4/06	Date	11/17/06	Date	11/26/07	Date	10/23/08	Date	10/26/09	Date	0/0/0
Area	69.2	Area	72.3	Area	83.5	Area	88.1	Area	91.6	Area	0.0
Bkf W	27.3	Bkf W	25.7	Bkf W	26.2	Bkf W	26.2	Bkf W	29.8	Bkf W	10
Dmean	2.5	Dmean	2.8	Dmean	3.2	Dmean	3.4	Dmean	3.1	Dmean	0.0
Dmax	5.0	Dmax	5.2	Dmax	5.9	Dmax	6.1	Dmax	6.3	Dmax	0.0
W/d	10.8	W/d	9.1	W/d	8.2	W/d	7.8	W/d	9.7	W/d	0.0

Lick Creek Stream Restoration Site
Lee County, NC
Cross Section No. 2 - Pool
Reach 1 - Wallace Branch - Sta 13+78

As-Built			
Station	FS/BS	Elev.	Desc.
BM	4.81	213.08	IR Lt
HI		217.89	
0	4.87	213.02	GRND
3	5.03	212.86	
8	4.99	212.90	
13	4.98	212.91	TOB
15	5.69	212.20	
18	7.27	210.62	
20	8.36	209.53	
21.5	9.16	208.73	EOW
22.5	10.09	207.80	
24.4	10.91	206.98	
26	11.09	206.80	
28	10.93	206.96	
30	10.06	207.83	
31.2	9.96	207.93	
33.5	8.46	209.43	
37	7.47	210.42	
40	6.61	211.28	
42.3	6.08	211.81	TOB
45	5.46	212.43	
50	5.20	212.69	
55	5.01	212.88	
56.9	4.84	213.05	

Year 1			
Station	FS/BS	Elev.	Desc.
BM	4.87	213.08	IR Lt
HI		217.95	
1	4.99	212.96	
7	4.99	212.96	
12.2	4.99	212.96	ToB
15.4	5.91	212.04	
16.3	6.35	211.60	BKF
18	7.21	210.74	
19.4	7.95	210.00	
19.8	8.54	209.41	LEW
20.6	9.54	208.41	
22	10.60	207.35	
23.1	11.22	206.73	
24.4	11.44	206.51	
26.1	11.57	206.38	
27.2	11.46	206.49	
28.4	11.35	206.60	
29.8	11.10	206.85	
30.5	10.71	207.24	
31.8	10.21	207.74	
32	10.20	207.75	TOE
34.2	8.60	209.35	REW
36.7	7.53	210.42	
39	6.96	210.99	BKF
42	6.10	211.85	
45	5.62	212.33	ToB
50	5.21	212.74	
56.7	5.08	212.87	
56.7	4.90	213.05	IR Rt

Year 2			
Station	FS/BS	Elev.	Desc.
BM	5.07	213.08	IR Lt
HI		218.15	
0	5.14	213.01	
5	5.14	213.01	
10	5.24	212.91	
13	5.19	212.96	
14	5.54	212.61	
16	6.23	211.92	
17	6.63	211.52	
18	7.24	210.91	
19	7.75	210.40	
19.5	8.16	209.99	
20.2	9.02	209.13	
20.3	9.73	208.42	EOW
21	10.20	207.95	
22	11.04	207.11	
23	11.60	206.55	
24	12.04	206.11	
25	12.20	205.95	
26	12.14	206.01	
27	12.10	206.05	
28	12.08	206.07	
29	11.95	206.20	
30	11.83	206.32	
31	11.68	206.47	
31.2	10.86	207.29	
32	10.63	207.52	
33	10.20	207.95	
33.5	9.75	208.40	EOW
35	8.56	209.59	
36.6	7.69	210.46	
38	7.47	210.68	
39.3	7.08	211.07	
40.5	6.72	211.43	
42.2	6.32	211.83	
44	6.22	211.93	
45.2	5.85	212.30	
47	5.62	212.53	
50	5.36	212.79	
53	5.31	212.84	
56.9	5.25	212.90	
57	5.13	213.02	IR Rt

Year 3			
Station	FS/BS	Elev.	Desc.
BM	5.02	213.71	IR Lt
HI		218.73	
-20	5.77	212.96	
-10	6.03	212.70	
0	5.78	212.95	GRND
5	5.89	212.84	
10	5.82	212.91	
13	5.8	212.93	
16	6.81	211.92	TOB
17	7.39	211.34	
18.2	8.01	210.72	
19.6	8.89	209.84	
20.2	9.6	209.13	
20.4	11.1	207.63	
23.5	12.4	206.33	
26	12.84	205.89	
28	13	205.73	
30	12.9	205.83	
31.8	12.48	206.25	
33.1	11.05	207.68	
34.3	9.99	208.74	EOW
35	9.12	209.61	
37	8.32	210.41	
39.5	7.6	211.13	
42.4	6.9	211.83	TOB
44	6.8	211.93	
46	6.35	212.38	
49	6.05	212.68	
52	5.98	212.75	
55	5.88	212.85	
57	5.88	212.85	GRND
61	5.85	212.88	
70	5.85	212.88	

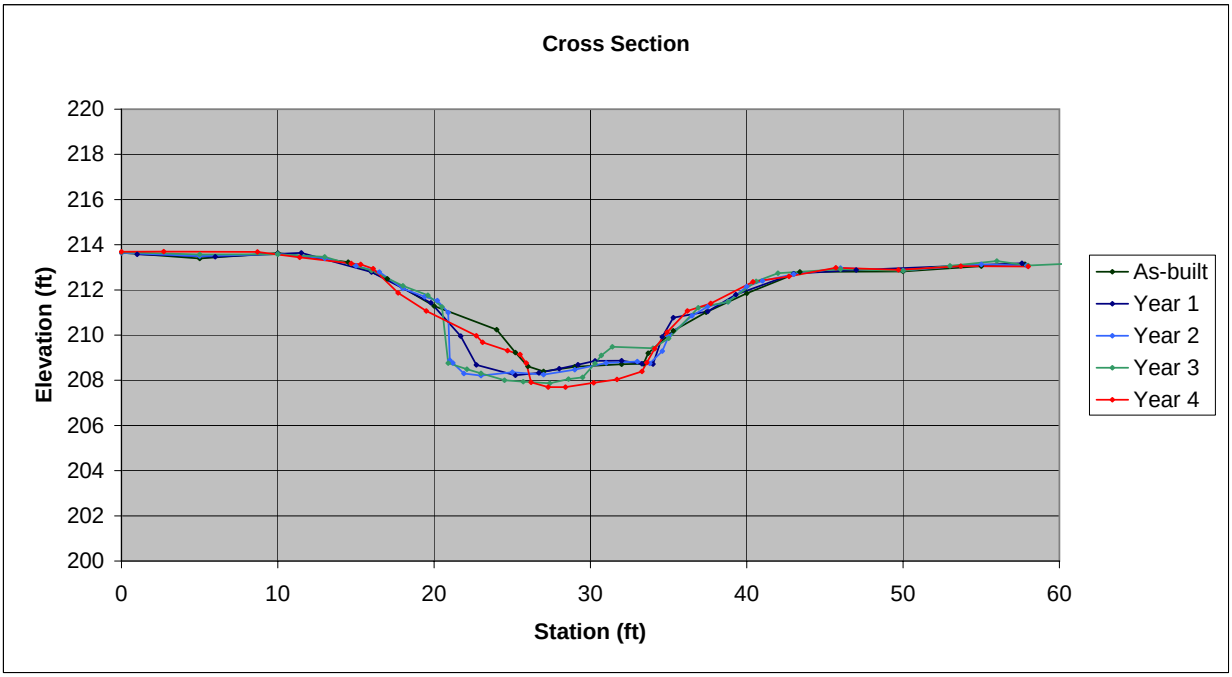
Year 4			
Station	FS/BS	Elev.	Desc.
BM	5.30	213.08	XS-2 IR Lt
HI		218.38	
0	5.37	213.01	GRND
3	5.45	212.93	GRND
4.5	5.30	213.08	GRND
8	5.46	212.92	GRND
11	5.36	213.02	GRND
12.5	5.40	212.98	BKF
13.5	5.54	212.84	BKF
15	6.12	212.26	BNK
17.7	7.33	211.05	BNK
19.1	8.14	210.24	BNK
19.7	8.58	209.80	BNK
20.2	9.44	208.94	EOW
20.4	10.65	207.73	BED
22	11.48	206.90	BED
24	12.22	206.16	BED
26	12.49	205.89	BED
28	12.70	205.68	BED
30	12.59	205.79	BED
32	12.03	206.35	BED
33.5	11.41	206.97	BED
34.4	9.44	208.94	EOW
34.5	9.04	209.34	BNK
35.7	8.35	210.03	BNK
36.5	7.91	210.47	BNK
38.7	7.34	211.04	BNK
39.5	6.99	211.39	BNK
42.3	6.39	211.99	BKF
44.1	6.3	212.08	GRND
45.4	5.92	212.46	GRND
46.5	5.86	212.52	GRND
48	5.65	212.73	GRND
50	5.53	212.85	GRND
55	5.4	212.98	GRND
56.9	5.44	212.94	GRND

Year 5			
Station	FS/BS	Elev.	Desc.
BM	0.00	100.00	IR Lt
HI		100.00	

Lick Creek Stream Restoration Site
Lee County, NC
Cross Section No. 3 - Riffle
Reach 2 - Lick Creek - Sta 13+37

Year 3 Year 4

Facing Downstream



As-Built		Year 1		Year 2		Year 3		Year 4		Year 5	
Date	5/5/06	Date	11/17/06	Date	11/26/07	Date	10/23/08	Date	10/26/09	Date	0/0/0
Area	64.5	Area	68.0	Area	69.8	Area	69.4	Area	75.4	Area	0.0
Bkf W	28.9	Bkf W	27	Bkf W	26.4	Bkf W	26.4	Bkf W	29.6	Bkf W	10
Dmean	2.2	Dmean	2.5	Dmean	2.6	Dmean	2.6	Dmean	2.5	Dmean	0.0
Dmax	4.4	Dmax	4.5	Dmax	4.5	Dmax	4.8	Dmax	5.2	Dmax	0.0
W/d	13.0	W/d	10.7	W/d	10.0	W/d	10.0	W/d	11.6	W/d	0.0

Lick Creek Stream Restoration Site
Lee County, NC
Cross Section No. 3 - Riffle
Reach 2 - Lick Creek - Sta 13+37

As-Built

Station	FS/BS	Elev.	Desc.
BM	4.77	213.72	IR Lt
HI		218.49	
0	4.84	213.65	
5	5.10	213.39	
10	4.86	213.63	
14.5	5.26	213.23	TOB
17	6.00	212.49	
20	7.20	211.29	
24	8.25	210.24	
25.2	9.26	209.23	EOW
26	9.87	208.62	
27	10.10	208.39	
29	9.89	208.60	
32	9.78	208.71	
33.4	9.76	208.73	
33.7	9.29	209.20	EW
35.3	8.30	210.19	
37.4	7.48	211.01	HW
40	6.64	211.85	
43.4	5.69	212.80	TOB
50	5.67	212.82	
55	5.44	213.05	
57.8	5.35	213.14	IP

Year 1

Station	FS/BS	Elev.	Desc.
BM	4.56	213.72	IR Lt
HI		218.28	
1	4.70	213.58	
6	4.81	213.47	
11.5	4.64	213.64	ToB
16	5.49	212.79	
19.8	6.85	211.43	BKF
21.7	8.32	209.96	LEW
22.7	9.60	208.68	TOE
25.2	10.06	208.22	THL
26.7	9.95	208.33	
28	9.77	208.51	
29.2	9.59	208.69	
30.3	9.42	208.86	
32	9.41	208.87	
33.3	9.55	208.73	
34	9.56	208.72	TOE
34.6	8.36	209.92	REW
35.3	7.51	210.77	
37.5	7.23	211.05	
39.3	6.49	211.79	BKF
43	5.56	212.72	ToB
47	5.40	212.88	
57.6	5.10	213.18	Stake Rt

Year 2

Station	FS/BS	Elev.	Desc.
BM	5.16	213.72	IR Lt
HI		218.88	
0	5.24	213.64	
5	5.38	213.50	
10	5.29	213.59	
13	5.48	213.40	
15	5.81	213.07	
16.5	6.09	212.79	
18	6.82	212.06	
19.4	7.18	211.70	
20.2	7.35	211.53	
20.9	7.88	211.00	
21	9.99	208.89	
21.2	10.11	208.77	EOW
21.9	10.58	208.30	
23	10.67	208.21	
25	10.52	208.36	
27	10.63	208.25	
29	10.41	208.47	
31	10.11	208.77	EOW
33	10.05	208.83	
33.8	10.13	208.75	
34.6	9.59	209.29	
35	8.93	209.95	
36.5	8.02	210.86	
37.5	7.62	211.26	
38.8	7.40	211.48	
40	6.73	212.15	
41	6.48	212.40	
43	6.19	212.69	
46	5.91	212.97	
50	6.02	212.86	
55	5.75	213.13	
57.9	5.80	213.08	GROUND

Year 3

Station	FS/BS	Elev.	Desc.
BM	9.05	209.81	IR Lt
HI		218.86	
-20	5.55	213.31	
-10	5.17	213.69	
0	5.19	213.67	GRND
5	5.29	213.57	
10	5.28	213.58	
13	5.40	213.46	
16	6.00	212.86	TOB
18	6.68	212.18	
19.6	7.10	211.76	
20.5	7.61	211.25	
20.9	10.10	208.76	EOW
22.1	10.37	208.49	
23	10.55	208.31	
24.5	10.86	208.00	
25.7	10.92	207.94	
27.4	10.99	207.87	
28.6	10.81	208.05	
29.5	10.73	208.13	
30.3	10.11	208.75	EOW
30.7	9.76	209.10	
31.4	9.38	209.48	
34	9.44	209.42	
35	9.00	209.86	
36.9	7.65	211.21	
38.8	7.39	211.47	
40.6	6.48	212.38	
42	6.12	212.74	TOB
46	5.94	212.92	
50	6.01	212.85	
53	5.79	213.07	
56	5.58	213.28	
58	5.78	213.08	GRND
63	5.62	213.24	
67	5.83	213.03	
72	5.99	212.87	

Year 4

Station	FS/BS	Elev.	Desc.
BM	4.78	213.72	IR Lt
HI		218.50	
0	4.81	213.69	GRND
2.7	4.80	213.70	GRND
8.7	4.82	213.68	GRND
11.4	5.06	213.44	GRND
14.7	5.33	213.17	GRND
15.3	5.37	213.13	GRND
16.1	5.56	212.94	BKF
17.7	6.63	211.87	BNK
19.5	7.43	211.07	BNK
22.7	8.53	209.97	BNK
23.1	8.82	209.68	BNK
24.7	9.19	209.31	BNK
25.5	9.36	209.14	BNK
25.9	9.74	208.76	EOW
26.2	10.59	207.91	BED
27.3	10.80	207.70	BED
28.4	10.80	207.70	BED
30.2	10.61	207.89	BED
31.7	10.46	208.04	BED
33.3	10.11	208.39	BED
33.6	9.72	208.78	EOW
34.1	9.10	209.40	BNK
34.9	8.37	210.13	BNK
36.2	7.43	211.07	BNK
37.7	7.10	211.40	BNK
40.4	6.14	212.36	BNK
42.7	5.90	212.60	BNK
45.7	5.52	212.98	BKF
49.7	5.61	212.89	GRND
53.7	5.45	213.05	GRND
58	5.46	213.04	GRND

Year 5

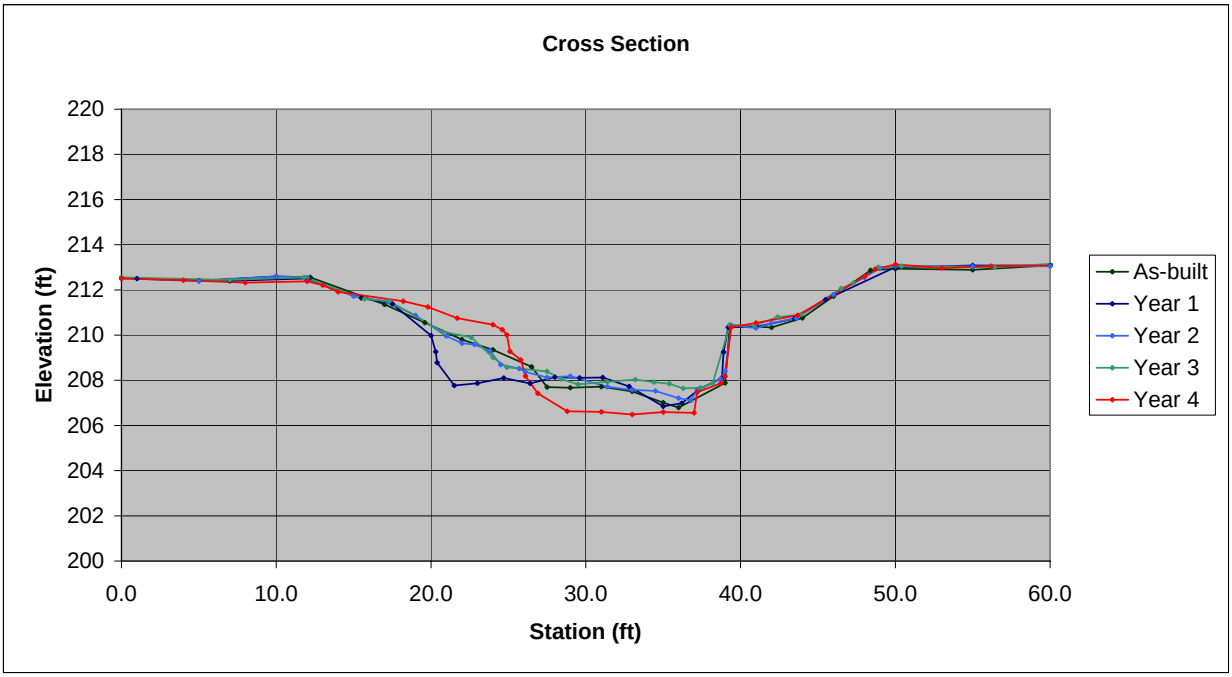
Station	FS/BS	Elev.	Desc.
BM	0.00	100.00	IR Lt
HI		100.00	

Lick Creek Stream Restoration Site
Lee County, NC
Cross Section No. 4 - Pool
Reach 2 - Lick Creek - Sta 15+91

Year 3

Year 4

Facing Downstream



As-Built		Year 1		Year 2		Year 3		Year 4		Year 5	
Date	5/5/06	Date	11/17/06	Date	11/26/07	Date	10/23/08	Date	10/26/09	Date	0/0/0
Area	105.2	Area	109.7	Area	102.9	Area	96.2	Area	100.0	Area	0.0
Bkf W	36.2	Bkf W	38.1	Bkf W	36	Bkf W	36	Bkf W	36	Bkf W	10
Dmean	2.9	Dmean	2.9	Dmean	2.9	Dmean	2.7	Dmean	2.8	Dmean	0.0
Dmax	5.8	Dmax	5.7	Dmax	5.4	Dmax	4.9	Dmax	5.9	Dmax	0.0
W/d	12.5	W/d	13.2	W/d	12.6	W/d	13.5	W/d	13.0	W/d	0.0

Lick Creek Stream Restoration Site
Lee County, NC
Cross Section No. 4 - Pool
Reach 2 - Lick Creek - Sta 15+91

As-Built			
Station	FS/BS	Elev.	Desc.
BM	5.27	212.56	IR Lt
HI		217.83	
0.0	5.31	212.52	
5.0	5.42	212.41	
10.0	5.23	212.60	
12.2	5.27	212.56	TOB
17.0	6.47	211.36	
19.6	7.28	210.55	HW
22.0	8.03	209.80	
24.0	8.48	209.35	
26.5	9.23	208.60	EW
27.5	10.13	207.70	
29.0	10.16	207.67	
31.0	10.11	207.72	
33.0	10.32	207.51	
35.0	10.82	207.01	
36.0	11.04	206.79	
39.0	9.95	207.88	
39.3	7.39	210.44	
42.0	7.49	210.34	
44.0	7.07	210.76	
46.0	6.11	211.72	
48.4	4.96	212.87	TOB
50.0	4.89	212.94	
55.0	4.94	212.89	
60.0	4.74	213.09	
63.2	4.61	213.22	IP RT

Year 1			
Station	FS/BS	Elev.	Desc.
BM	5.80	212.56	IR Lt
HI		218.36	
1.0	5.86	212.50	
7.0	5.96	212.40	
11.9	5.85	212.51	ToB
15.5	6.72	211.64	BKF
17.5	6.98	211.38	
20.0	8.38	209.98	
20.3	9.10	209.26	LEW
20.4	9.58	208.78	TOE
21.5	10.59	207.77	
23.0	10.49	207.87	
24.7	10.26	208.10	
26.4	10.50	207.86	
28.0	10.22	208.14	
29.6	10.25	208.11	
31.1	10.24	208.12	
32.8	10.63	207.73	
35.0	11.51	206.85	
36.2	11.38	206.98	
37.3	10.77	207.59	
38.8	10.26	208.10	TOE
38.9	9.11	209.25	REW
39.2	8.01	210.35	
41.0	7.99	210.37	
43.5	7.63	210.73	
45.5	6.79	211.57	BKF
50.0	5.35	213.01	ToB
55.0	5.28	213.08	
61.0	5.28	213.08	
63.0	5.25	213.11	
63.0	5.16	213.20	IR Rt

Year 2			
Station	FS/BS	Elev.	Desc.
BM	6.00	212.56	IR Lt
HI		218.56	
0	6.04	212.52	
5	6.17	212.39	
10	5.96	212.60	
12	6.02	212.54	
15	6.84	211.72	
17.2	7.09	211.47	
19	7.69	210.87	
21	8.60	209.96	
22	8.92	209.64	
22.8	8.98	209.58	
23.8	9.26	209.30	
24.5	9.87	208.69	
25.7	10.04	208.52	
26.1	10.19	208.37	EOW
27.5	10.44	208.12	
29	10.38	208.18	
31.4	10.85	207.71	
33	10.98	207.58	
34.5	11.03	207.53	
36	11.35	207.21	
36.8	11.45	207.11	
37.2	10.99	207.57	
38.7	10.50	208.06	
39	10.15	208.41	EOW
39.4	8.13	210.43	
41	8.25	210.31	
42	8.03	210.53	
43.6	7.81	210.75	
46	6.76	211.80	
48	6.00	212.56	
49	5.60	212.96	
50	5.50	213.06	
55	5.52	213.04	
60	5.51	213.05	
63.3	5.49	213.07	GROUND

Year 3			
Station	FS/BS	Elev.	Desc.
BM	8.72	209.63	IR Lt
HI		218.35	
-20	5.43	212.92	
-10	5.73	212.62	
0	5.79	212.56	GRND
7	5.91	212.44	
11.8	5.79	212.56	TOB
15.7	6.75	211.60	
17.3	6.84	211.51	
20.7	8.19	210.16	
22.6	8.45	209.90	
24	9.34	209.01	
24.9	9.77	208.58	
27.5	9.96	208.39	
28.4	10.29	208.06	EOW
29.5	10.53	207.82	
31.4	10.42	207.93	
33.2	10.32	208.03	
34.4	10.43	207.92	
35.4	10.50	207.85	
36.3	10.71	207.64	
37.4	10.68	207.67	
38.2	10.49	207.86	
39.3	7.91	210.44	
40.9	7.92	210.43	
42.4	7.55	210.80	
43.9	7.44	210.91	
46.5	6.28	212.07	
47.3	6.05	212.30	
48.9	5.35	213	TOB
50.4	5.3	213.05	
56.4	5.34	213.01	
62	5.12	213.23	
63.3	5.25	213.1	GRND
68	5.26	213.09	
71	5.16	213.19	

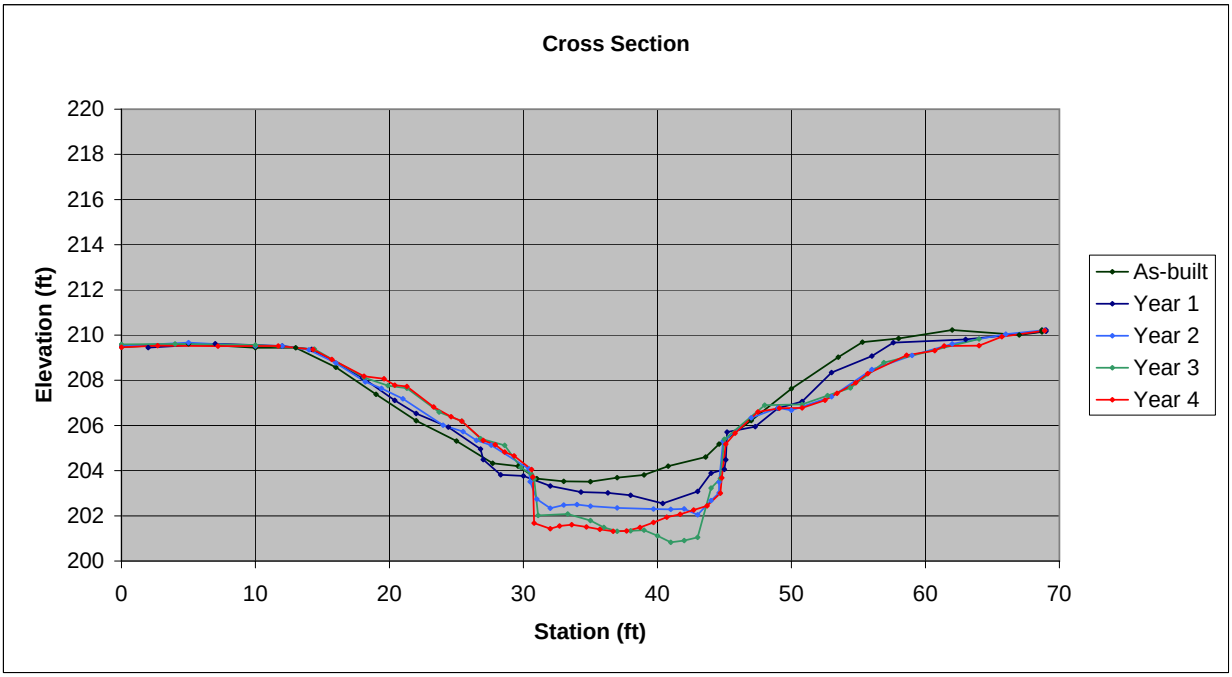
Year 4			
Station	FS/BS	Elev.	Desc.
BM	5.29	212.56	IR Lt
HI		217.85	
0	5.34	212.51	GRND
4	5.42	212.43	GRND
8	5.53	212.32	GRND
12	5.47	212.38	BKF
13	5.64	212.21	BNK
14	5.94	211.91	BNK
18.2	6.35	211.50	BNK
19.8	6.60	211.25	BNK
21.7	7.10	210.75	BNK
24	7.39	210.46	BNK
24.6	7.61	210.24	BNK
24.9	7.84	210.01	BNK
25.1	8.57	209.28	BR TOE
25.8	8.95	208.90	BR TOE
26.1	9.66	208.19	EOW
26.9	10.43	207.42	BED
28.8	11.22	206.63	BED
31	11.25	206.60	BED
33	11.36	206.49	BED
35	11.26	206.59	BED
37	11.29	206.56	BED
37.2	10.38	207.47	BLDR
38.7	9.99	207.86	BLDR
39	9.68	208.17	EOW
39.4	7.50	210.35	BLDR
41	7.31	210.54	BNK
43.7	6.97	210.88	BNK
48	5.26	212.59	BKF
48.7	4.93	212.92	GRND
50	4.72	213.13	GRND
53	4.88	212.97	GRND
56.2	4.8	213.05	GRND
63.6	4.74	213.11	GRND

Year 5			
Station	FS/BS	Elev.	Desc.
BM	0.00	100.00	IR Lt
HI		100.00	

Lick Creek Stream Restoration Site
Lee County, NC
Cross Section No. 5 - Riffle
Reach 3 - Lick Creek - Sta 14+41.5

Year 2 Year 3

Facing Downstream



As-Built		Year 1		Year 2		Year 3		Year 4		Year 5	
Date	5/5/06	Date	11/17/06	Date	11/26/07	Date	10/24/08	Date	10/27/09	Date	0/0/0
Area	150.3	Area	162.1	Area	160.2	Area	164.0	Area	146.8	Area	0.0
Bkf W	42.3	Bkf W	43.4	Bkf W	44.5	Bkf W	44.5	Bkf W	44.3	Bkf W	10
Dmean	3.6	Dmean	3.7	Dmean	3.6	Dmean	3.7	Dmean	3.3	Dmean	0.0
Dmax	5.9	Dmax	6.8	Dmax	7.0	Dmax	8.3	Dmax	8.0	Dmax	0.0
W/d	11.9	W/d	11.6	W/d	12.4	W/d	12.1	W/d	13.4	W/d	0.0

Lick Creek Stream Restoration Site
Lee County, NC
Cross Section No. 5 - Riffle
Reach 3 - Lick Creek - Sta 14+41.5

As-Built			
Station	FS/BS	Elev.	Desc.
BM	5.13	209.56	IR Lt
HI		214.69	
0.0	5.22	209.47	GRND
5.0	5.07	209.62	
10.0	5.25	209.44	
13.0	5.25	209.44	TOB
16.0	6.11	208.58	
19.0	7.31	207.38	
22.0	8.48	206.21	
25.0	9.38	205.31	
27.7	10.36	204.33	
29.6	10.49	204.20	EOW
31.0	11.04	203.65	
33.0	11.16	203.53	
35.0	11.18	203.51	
37.0	11.00	203.69	
39.0	10.88	203.81	
40.8	10.49	204.20	EOW
43.6	10.09	204.60	
44.6	9.51	205.18	
47.0	8.47	206.22	
50.0	7.06	207.63	
53.5	5.67	209.02	
55.3	5.00	209.69	TOB
58.0	4.84	209.85	
62.0	4.46	210.23	
67.0	4.68	210.01	
68.7	4.55	210.14	
68.7	4.46	210.23	IR RT

Year 1			
Station	FS/BS	Elev.	Desc.
BM	4.72	209.56	IR Lt
HI		214.28	
2.0	4.83	209.45	
7.0	4.66	209.62	
12.0	4.76	209.52	
14.2	4.91	209.37	ToB
18.0	6.17	208.11	
20.4	7.17	207.11	BKF
22.0	7.75	206.53	
24.4	8.35	205.93	
26.8	9.32	204.96	
27.0	9.79	204.49	LEW
28.3	10.46	203.82	TOE
30.0	10.51	203.77	
32.0	10.96	203.32	
34.3	11.23	203.05	
36.3	11.26	203.02	
38.0	11.37	202.91	
40.4	11.73	202.55	
43.0	11.20	203.08	
44.0	10.39	203.89	
45.0	10.22	204.06	
45.1	9.80	204.48	REW
45.2	8.57	205.71	BOULDER
47.3	8.33	205.95	
49.0	7.52	206.76	
50.8	7.22	207.06	
53.0	5.94	208.34	BKF
56.0	5.21	209.07	
57.6	4.61	209.67	ToB
63.0	4.47	209.81	
69.0	4.11	210.17	
69.0	4.05	210.23	IR Rt

Year 2			
Station	FS/BS	Elev.	Desc.
BM	5.18	209.56	IR Lt
HI		214.74	
0	5.22	209.52	
5	5.07	209.67	
10	5.23	209.51	
12	5.22	209.52	
14	5.39	209.35	
16	5.97	208.77	
18.2	6.81	207.93	
19.4	7.10	207.64	
21	7.56	207.18	
24	8.73	206.01	
25.5	9.01	205.73	
26.5	9.40	205.34	
27.6	9.61	205.13	
30.4	10.66	204.08	
30.5	11.23	203.51	EOW
31	12.00	202.74	
32	12.40	202.34	
33	12.26	202.48	
34	12.24	202.50	
35	12.31	202.43	
37	12.39	202.35	
39.7	12.44	202.30	
41	12.45	202.29	
42	12.43	202.31	
43	12.69	202.05	
44	12.06	202.68	
44.6	11.72	203.02	EOW
44.6	11.24	203.50	ROCK
44.9	9.44	205.30	
47	8.40	206.34	
49	7.96	206.78	
50	8.07	206.67	
53	7.47	207.27	
56	6.26	208.48	
59	5.64	209.10	
62	5.13	209.61	
66	4.70	210.04	
68.9	4.52	210.22	IR Rt

Year 3			
Station	FS/BS	Elev.	Desc.
BM	10.57	204.58	IR Lt
HI		215.15	
-17	5.47	209.68	
-9	5.80	209.35	
0	5.56	209.59	GRND
4	5.54	209.61	
10	5.59	209.56	
14.4	5.77	209.38	TOB
18.1	7.03	208.12	
19.9	7.39	207.76	
21.3	7.50	207.65	
23.7	8.56	206.59	
25.4	8.96	206.19	
26.8	9.73	205.42	
28.6	10.03	205.12	
29.8	11.01	204.14	
30.6	11.32	203.83	
30.8	11.52	203.63	EOW
31.1	13.13	202.02	
33.3	13.07	202.08	
35	13.36	201.79	
36	13.66	201.49	
37	13.83	201.32	
38	13.81	201.34	
39	13.78	201.37	
40	14.03	201.12	
41	14.32	200.83	
42	14.24	200.91	
43	14.1	201.05	
44	11.92	203.23	
44.7	11.5	203.65	EOW
45	9.76	205.39	ROCK
48	8.25	206.9	
50.8	8.22	206.93	
52.7	7.83	207.32	
54.4	7.49	207.66	
56.9	6.37	208.78	
64	5.32	209.83	TOB
66.5	4.97	210.18	
68.9	4.91	210.24	GRND
72	5.09	210.06	
77.6	5.59	209.56	
85	5.88	209.27	
90	6.11	209.04	

Year 4			
Station	FS/BS	Elev.	Desc.
BM	5.17	209.56	IR Lt
HI		214.73	
0	5.27	209.46	GRND
2.7	5.20	209.53	GRND
7.2	5.22	209.51	GRND
11.7	5.21	209.52	GRND
14.3	5.37	209.36	BKF
15.7	5.81	208.92	BNK
18.1	6.55	208.18	BNK
19.6	6.66	208.07	BNK
20.4	6.95	207.78	BNK
21.3	7.00	207.73	BNK
23.3	7.91	206.82	BNK
24.6	8.34	206.39	BNK
25.4	8.54	206.19	BNK
27	9.39	205.34	BNK
27.9	9.58	205.15	BNK
28.6	9.91	204.82	BNK
29.3	10.08	204.65	BNK
30.6	10.68	204.05	BNK
30.7	11.01	203.72	EOW
30.8	13.05	201.68	BED
32	13.30	201.43	BED
32.7	13.18	201.55	BED
33.6	13.12	201.61	BED
34.7	13.22	201.51	BED
35.7	13.33	201.40	BED
36.7	13.41	201.32	BED
37.7	13.40	201.33	BED
38.7	13.24	201.49	BED
39.7	13.02	201.71	BED
40.7	12.79	201.94	BED
41.7	12.66	202.07	BED
42.7	12.47	202.26	BED
43.7	12.29	202.44	BED
44.7	11.73	203.00	BED
44.8	11.05	203.68	EOW
45.1	9.55	205.18	BLDR
45.8	9.07	205.66	BLDR
47.5	8.13	206.60	BNK
49.1	7.97	206.76	BNK
50.8	7.95	206.78	BNK
52.5	7.61	207.12	BNK
53.4	7.31	207.42	BNK
54.8	6.84	207.89	BNK
55.7	6.44	208.29	BNK
58.6	5.62	209.11	BKF
60.7	5.42	209.31	GRND
61.4	5.21	209.52	GRND
64	5.2	209.53	GRND
65.7	4.8	209.93	GRND
68.9	4.53	210.20	GRND

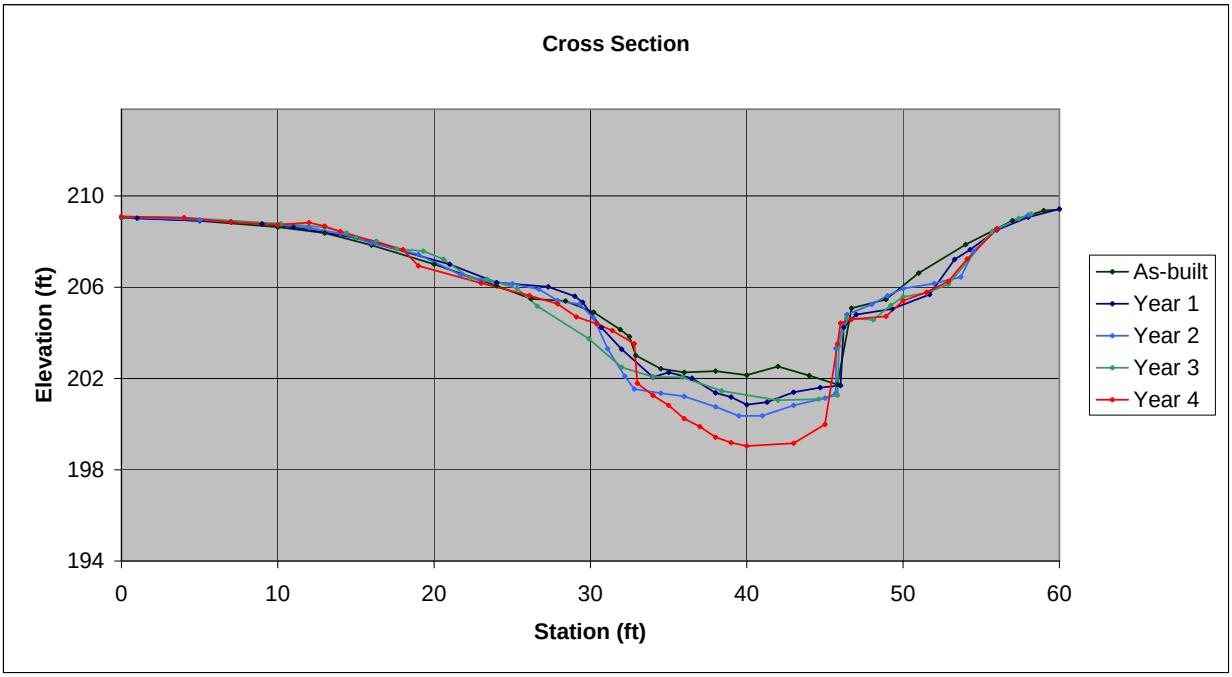
Year 5			
Station	FS/BS	Elev.	Desc.
BM	0.00	100.00	IR Lt
HI		100.00	

Lick Creek Stream Restoration Site
Lee County, NC
Cross Section No. 6 - Pool
Reach 3 - Lick Creek - Sta 15+73.5

Year 2

Year 3

Facing Downstream



As-Built		Year 1		Year 2		Year 3		Year 4		Year 5	
Date	5/5/06	Date	11/17/06	Date	11/26/07	Date	10/24/08	Date	10/27/09	Date	0/0/0
Area	140.7	Area	164.1	Area	170.9	Area	169.4	Area	186.1	Area	0.0
Bkf W	43	Bkf W	45	Bkf W	43	Bkf W	43	Bkf W	43	Bkf W	10
Dmean	3.3	Dmean	3.6	Dmean	4.0	Dmean	3.9	Dmean	4.3	Dmean	0.0
Dmax	6.7	Dmax	7.8	Dmax	8.3	Dmax	7.6	Dmax	9.6	Dmax	0.0
W/d	13.1	W/d	12.3	W/d	10.8	W/d	10.9	W/d	9.9	W/d	0.0

Lick Creek Stream Restoration Site
Lee County, NC
Cross Section No. 6 - Pool
Reach 3 - Lick Creek - Sta 15+73.5

As-Built			
Station	FS/BS	Elev.	Desc.
BM	5.40	209.31	IR Lt
HI		214.71	
0.0	5.51	209.20	GRND
5.0	5.65	209.06	
10.0	5.93	208.78	
13.0	6.19	208.52	TOB
16.0	6.73	207.98	
20.0	7.57	207.14	
24.0	8.53	206.18	
26.2	9.10	205.61	
28.4	9.20	205.51	
30.2	9.70	205.01	
31.9	10.46	204.25	
32.5	10.78	203.93	EOW
32.9	11.61	203.10	
34.5	12.20	202.51	
36.0	12.36	202.35	
38.0	12.30	202.41	
40.0	12.48	202.23	
42.0	12.10	202.61	
44.0	12.50	202.21	
45.8	12.90	201.81	
46.7	9.52	205.19	
48.9	9.13	205.58	
51.0	7.96	206.75	
54.0	6.70	208.01	
56.0	6.00	208.71	
57.0	5.64	209.07	TOB
59.0	5.20	209.51	
62.0	5.06	209.65	
66.0	4.72	209.99	
70.9	4.68	210.03	
70.9	4.56	210.15	IR RT

Year 1			
Station	FS/BS	Elev.	Desc.
BM	4.77	209.31	IR Lt
HI		214.08	
1.0	4.90	209.18	
7.0	5.07	209.01	
9.0	5.16	208.92	ToB
11.0	5.31	208.77	
15.0	5.78	208.30	
21.0	6.95	207.13	BKF
24.0	7.76	206.32	
27.3	7.94	206.14	
29.0	8.36	205.72	
29.5	8.63	205.45	
30.7	9.74	204.34	LEW
32.0	10.70	203.38	
34.0	11.94	202.14	TOE
35.0	11.73	202.35	
36.5	11.99	202.09	
38.0	12.64	201.44	
39.0	12.82	201.26	
40.0	13.16	200.92	
41.3	13.05	201.03	
43.0	12.61	201.47	
44.7	12.40	201.68	
46.0	12.31	201.77	REW
46.2	9.73	204.35	
47.0	9.17	204.91	
49.3	8.92	205.16	
51.7	8.28	205.80	
53.3	6.73	207.35	
54.3	6.30	207.78	BKF
56.0	5.43	208.65	
58.0	4.86	209.22	ToB
60.0	4.50	209.58	
64.0	4.43	209.65	
68.0	3.96	210.12	IR Rt
71.0	4.12	209.96	

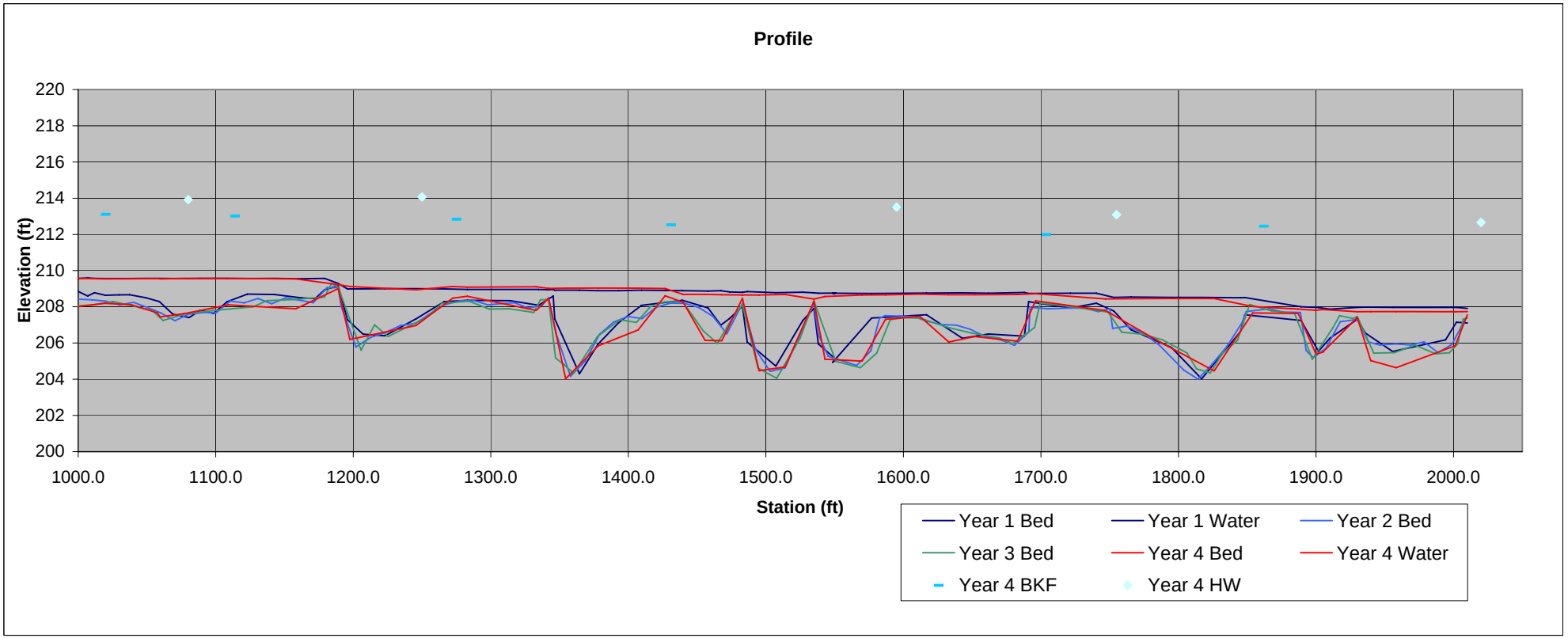
Year 2			
Station	FS/BS	Elev.	Desc.
BM	5.87	209.31	IR Lt
HI		215.18	
0	5.95	209.23	
5	6.08	209.10	
10	6.29	208.89	
12	6.43	208.75	
14	6.68	208.50	
16	7.10	208.08	
19	7.61	207.57	
21.7	8.51	206.67	
23	8.77	206.41	
25	8.91	206.27	
26.7	9.15	206.03	
27.9	9.65	205.53	
29.3	9.81	205.37	
30.2	10.42	204.76	
31.1	11.78	203.40	EOW
32.2	13.00	202.18	
32.8	13.57	201.61	
34.5	13.75	201.43	
36	13.89	201.29	
38	14.35	200.83	
39.5	14.76	200.42	
41	14.75	200.43	
43	14.29	200.89	
45	13.97	201.21	
45.7	13.75	201.43	
45.7	11.76	203.42	EOW
46.4	10.27	204.91	LOG
48	9.82	205.36	
49	9.44	205.74	
50	9.12	206.06	
52	8.89	206.29	
53.7	8.61	206.57	
54.5	7.47	207.71	
56	6.48	208.70	
58	5.87	209.31	
60	5.59	209.59	
61.3	5.59	209.59	
62	5.94	209.24	
65	5.96	209.22	
67	5.38	209.80	
70.9	5.23	209.95	GROUND

Year 3			
Station	FS/BS	Elev.	Desc.
BM	10.57	204.58	IR Lt
HI		215.15	
-18	6.33	208.82	
-15	5.99	209.16	
-5	6.02	209.13	
0	5.90	209.25	GRND
4	5.95	209.20	
10.2	6.22	208.93	
13	6.38	208.77	TOB
14.4	6.63	208.52	
15	6.84	208.31	
16.3	6.99	208.16	
17.6	7.33	207.82	
19.3	7.43	207.72	
20.6	7.79	207.36	
22.3	8.62	206.53	
23.4	8.68	206.47	
25.3	9.08	206.07	
26.6	9.87	205.28	
29.9	11.31	203.84	EOW
32	12.57	202.58	
34	13.00	202.15	
35.9	13.02	202.13	
38.4	13.62	201.53	
42	14.03	201.12	
44.6	13.98	201.17	
45.8	13.81	201.34	
45.9	11.64	203.51	EOW
46.4	10.40	204.75	LOG
48.1	10.47	204.68	
49.2	9.84	205.31	
50	9.46	205.69	
51.5	9.28	205.87	
52.9	8.9	206.25	
55.7	6.56	208.59	TOB
57.4	5.99	209.16	
58.2	5.79	209.36	
60.5	5.49	209.66	
62	5.92	209.23	
65	5.92	209.23	
68.9	5.39	209.76	
70.9	5.21	209.94	GRND
72	5.15	210	
76	6.03	209.12	
79	6.22	208.93	

Year 4			
Station	FS/BS	Elev.	Desc.
BM	4.78	209.31	IR Lt
HI		214.09	
0	4.84	209.25	GRND
4	4.90	209.19	GRND
7	5.09	209.00	GRND
10	5.20	208.89	GRND
12	5.11	208.98	GRND
13	5.27	208.82	BKF
14	5.51	208.58	BNK
18	6.31	207.78	BNK
19	7.02	207.07	BNK
23	7.79	206.30	BNK
26.1	8.34	205.75	BNK
27.9	8.71	205.38	BNK
29.1	9.28	204.81	BNK
30.4	9.59	204.50	BNK
31.4	9.89	204.20	BNK
32.8	10.47	203.62	EOW
33	12.22	201.87	BED
34	12.76	201.33	BED
35	13.20	200.89	BED
36	13.79	200.30	BED
37	14.14	199.95	BED
38	14.61	199.48	BED
39	14.85	199.24	BED
40	15.00	199.09	BED
43	14.88	199.21	BED
45	14.04	200.05	BED
45.8	10.49	203.60	EOW
46	9.56	204.53	LOG
46.7	9.39	204.70	LOG
48.9	9.26	204.83	BNK
50	8.57	205.52	BNK
51.5	8.19	205.90	BNK
52.9	7.71	206.38	BNK
54.1	6.72	207.37	BNK
56	5.4	208.69	BKF
57.3	4.99	209.10	GRND
58	4.76	209.33	GRND
60	4.52	209.57	GRND
61	4.44	209.65	GRND
62.5	5.09	209.00	GRND
65.3	4.8	209.29	GRND
66.7	4.41	209.68	GRND
69	4.33	209.76	GRND
70.9	4.19	209.90	GRND

Year 5			
Station	FS/BS	Elev.	Desc.
BM	0.00	100.00	IR Lt
HI		100.00	

Lick Creek Stream Restoration Site
Lee County, NC
Profile Reach 1 - Wallace Branch

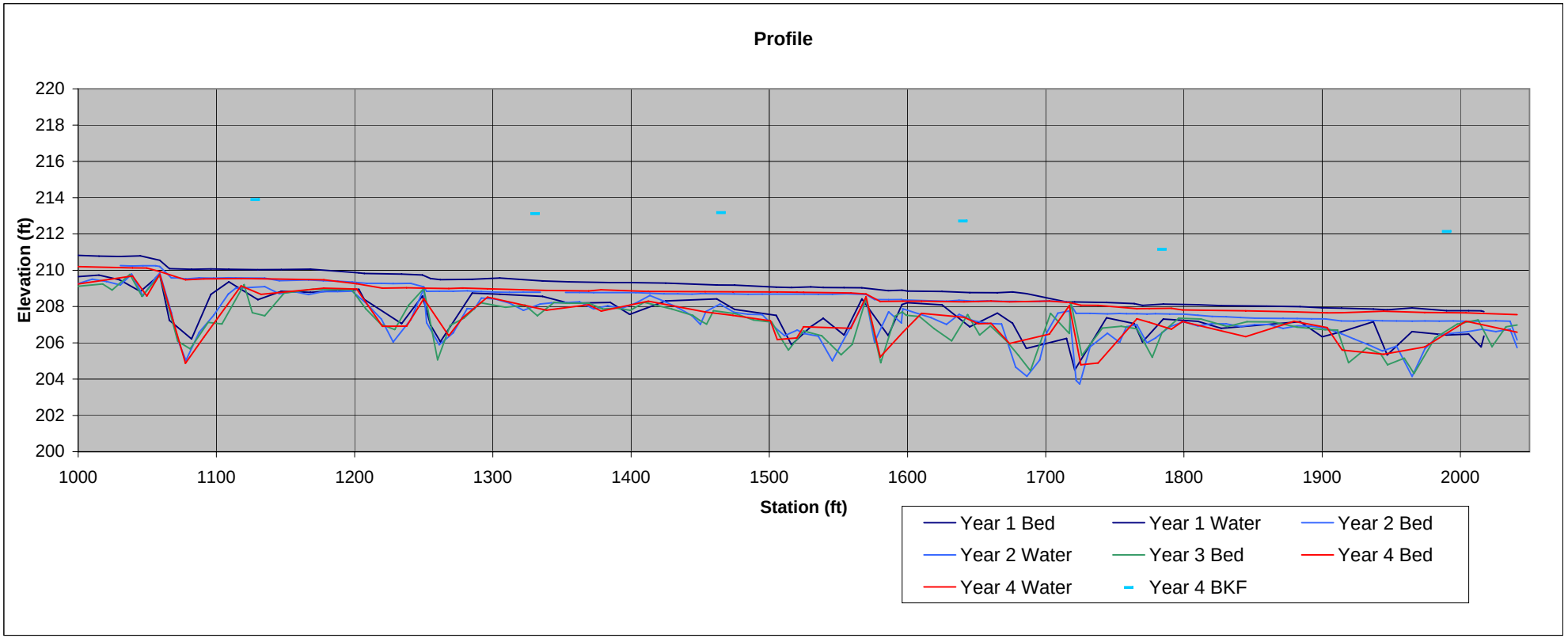


Lick Creek Stream Restoration Site
Lee County, NC
Profile Reach 1 - Wallace Branch

Year 4

HI	Station	Bed FS	Bed Elev.	Water Depth	Water Elev.	Bankfull FS	Bankfull Elev.	Description
218.21	1000	10.20	208.01	1.57	209.58			HOR
218.21	1020	10.02	208.19	1.35	209.54	5.10	213.11	HOR
218.21	1040	10.09	208.12	1.43	209.55			TOR
218.21	1060	10.54	207.67	1.89	209.56			
218.21	1062	10.77	207.44	2.10	209.54			BPL
218.21	1080	10.59	207.62	1.95	209.57	4.29	213.92	EPL
218.21	1114	10.10	208.11	1.46	209.57	5.20	213.01	HOR
218.21	1165	10.32	207.89	1.65	209.54			RIF
218.21	1197	9.21	209.00	0.23	209.23			LV INV
218.21	1205	12.01	206.20	2.92	209.12			BPL
218.21	1250	11.24	206.97	1.97	208.94	4.14	214.07	EPL
218.40	1275	9.92	208.48	0.64	209.12	5.56	212.84	HOR
218.40	1285	9.82	208.58	0.51	209.09			XS-1
218.40	1340	10.60	207.80	1.31	209.11			TOR
218.40	1350	9.92	208.48	0.54	209.02			LV INV
218.40	1360	14.37	204.03	5.00	209.03			BPL
218.40	1379	12.56	205.84	3.20	209.04			XS-2
218.40	1410	11.68	206.72	2.31	209.03			EPL
218.40	1431	9.79	208.61	0.40	209.01	5.87	212.53	HOR
218.40	1445	10.15	208.25	0.44	208.69			TOR
218.40	1462	12.25	206.15	2.54	208.69			BPL
218.40	1475	12.27	206.13	2.54	208.67			EPL
218.40	1491	9.93	208.47	0.18	208.65			LV INV
218.40	1503	13.93	204.47	4.18	208.65			BPL
218.40	1522	13.72	204.68	4.00	208.68			EPL
218.40	1543	10.09	208.31	0.12	208.43			RV INV
217.61	1551	12.50	205.11	3.46	208.57			BPL
217.61	1578	12.61	205.00	3.65	208.65			EPL
217.61	1595	10.30	207.31	1.35	208.66	4.10	213.51	HOR
217.61	1620	10.14	207.47	1.23	208.70			TOR
217.61	1641	11.55	206.06	2.61	208.67			BPL
217.61	1660	11.25	206.36	2.31	208.67			PL
217.61	1691	11.51	206.10	2.58	208.68			EPL
217.61	1704	9.28	208.33	0.39	208.72	5.62	211.99	HOR
217.61	1755	9.82	207.79	0.65	208.44	4.52	213.09	TOR
217.61	1795	11.57	206.04	2.42	208.46			BPL
217.61	1834	13.15	204.46	4.00	208.46			EPL
217.61	1862	9.95	207.66	0.36	208.02	5.16	212.45	HOR
217.00	1895	9.36	207.64	0.24	207.88			TOR LV?
217.00	1908	11.61	205.39	2.42	207.81			BPL
217.00	1913	11.50	205.50	2.35	207.85			EPL
217.00	1938	9.59	207.41	0.32	207.73			LV INV
217.00	1948	11.97	205.03	2.71	207.74			BPL
217.00	1967	12.36	204.64	3.10	207.74			EPL
217.00	2011	11.15	205.85	1.88	207.73			EPL
217.00	2020	9.44	207.56	0.18	207.74	4.34	212.66	EP-1

Lick Creek Stream Restoration Site
Lee County, NC
Profile Reach 2 - Lick Creek

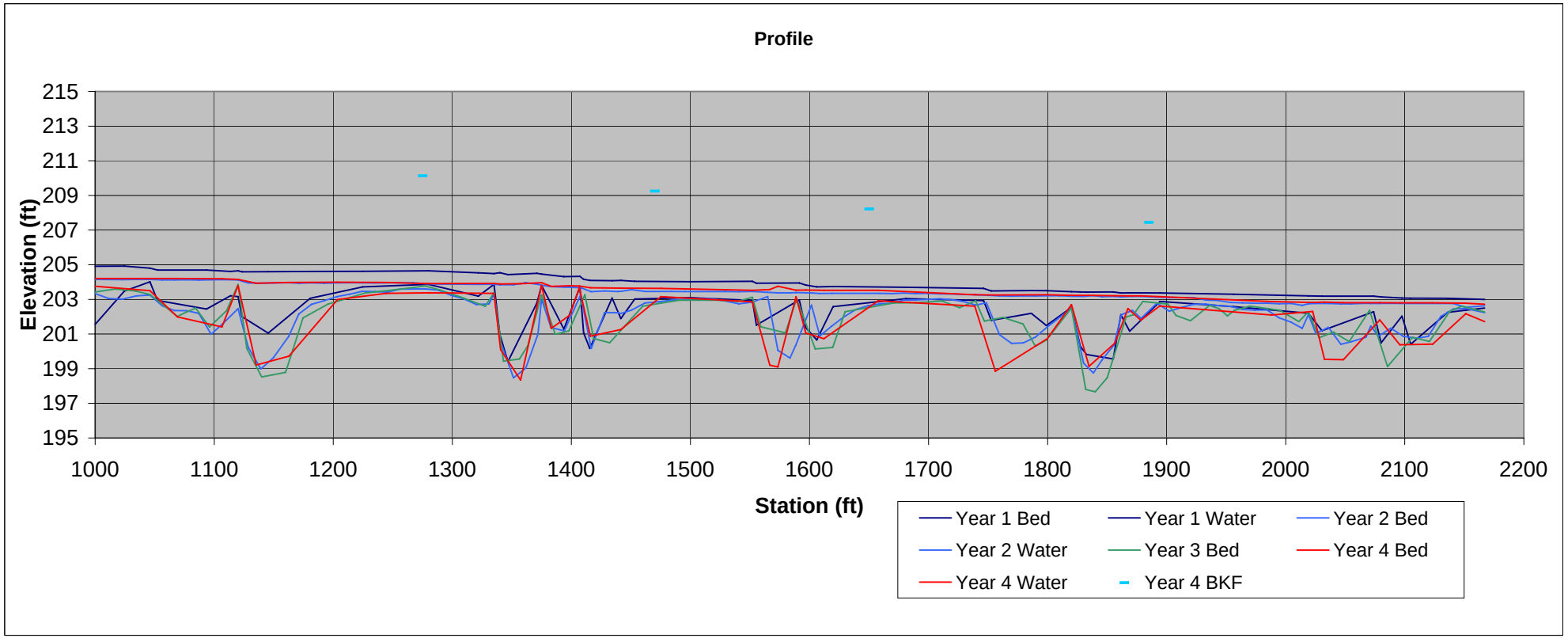


Lick Creek Stream Restoration Site
Lee County, NC
Profile Reach 2 - Lick Creek

Year 4

HI	Station	Bed FS	Bed Elev.	Water Depth	Water Elev.	Bankfull FS	Bankfull Elev.	Description
219.29	1000	10.05	209.24	0.96	210.20			BP 2 RIF
219.29	1038	9.61	209.68	0.45	210.13			RIF
219.29	1048	10.71	208.58	1.54	210.12			PL
219.29	1057	9.52	209.77	0.16	209.93			RCV INV
219.29	1075	14.42	204.87	4.60	209.47			BPL
219.29	1088	12.97	206.32	3.20	209.52			EPL
219.29	1114	10.15	209.14	0.40	209.54			GL
219.29	1128	10.62	208.67	0.86	209.53	5.40	213.89	HOR
219.29	1172	10.28	209.01	0.46	209.47			TLR
219.29	1195	10.33	208.96	0.30	209.26			TLR *
219.29	1213	12.38	206.91	2.10	209.01			BPL
219.29	1230	12.37	206.92	2.11	209.03			EPL
219.29	1242	10.86	208.43	0.58	209.01			LV INV
219.29	1260	12.9	206.39	2.60	208.99			BPL
219.29	1270	11.91	207.38	1.64	209.02			EPL
218.82	1288	10.3	208.52	0.46	208.98			HOR
218.82	1330.5	11.02	207.80	1.09	208.89	5.70	213.12	XS-3
218.82	1361	10.72	208.10	0.76	208.86			TOR
218.82	1370	11.07	207.75	1.17	208.92			BPL
218.82	1404	10.53	208.29	0.54	208.83			THL
218.82	1445	11.12	207.70	1.12	208.82			EPL
218.82	1465	11.31	207.51	1.30	208.81	5.65	213.17	HOR
218.82	1492	11.61	207.21	1.59	208.80			TOR
218.82	1497	12.64	206.18	2.62	208.80			BPL
218.82	1511	12.55	206.27	2.52	208.79			PL
218.82	1516	11.94	206.88	1.90	208.78			THL
218.82	1550	12.02	206.80	1.95	208.75			EPL
218.82	1561	10.28	208.54	0.15	208.69			RCV INV
218.82	1571	13.6	205.22	3.06	208.28			BPL
218.82	1587	12.23	206.59	1.70	208.29			XS-4
218.82	1600	11.2	207.62	0.67	208.29			THL
218.82	1630	11.41	207.41	0.85	208.26			THL
217.07	1640	10.02	207.05	1.23	208.28	4.36	212.71	HOR
217.07	1649	10	207.07	1.23	208.30			TOR
217.07	1662	11.11	205.96	2.30	208.26			BPL
217.07	1690	10.59	206.48	1.82	208.30			EPL
217.07	1704	9.02	208.05	0.17	208.22			LV INV
217.07	1712	12.28	204.79	3.28	208.07			BPL
217.07	1724	12.18	204.89	3.17	208.06			EPL
217.07	1751	9.75	207.32	0.56	207.88			LV INV
217.07	1760	9.94	207.13	0.76	207.89			BPL
217.07	1776	10.32	206.75	1.15	207.90			EPL
217.07	1784	9.9	207.17	0.64	207.81	5.92	211.15	HOR
217.07	1830	10.73	206.34	1.42	207.76			TOR
217.07	1865	9.89	207.18	0.53	207.71			HOR
217.07	1889	10.23	206.84	0.81	207.65			TOR
217.07	1900	11.47	205.60	2.06	207.66			BPL
218.87	1930	13.5	205.37	2.37	207.74			POOL
218.87	1960	13.1	205.77	1.90	207.67			EPL
218.87	1990	11.68	207.19	0.46	207.65	6.74	212.13	HOR
218.87	2027	12.29	206.58	0.97	207.55			EP2

Lick Creek Stream Restoration Site
Lee County, NC
Profile Reach 3 - Lick Creek



Lick Creek Stream Restoration Site
Lee County, NC
Profile Reach 3 - Lick Creek

Year 4

HI	Station	Bed FS	Bed Elev.	Water Depth	Water Elev.	Bankfull FS	Bankfull Elev.	Description
214.98	1000	11.22	203.76	0.44	204.20			RIF
214.98	1041	11.48	203.50	0.70	204.20			TOR/LV
214.98	1065	12.99	201.99	2.21	204.20			BPL
214.98	1104	13.57	201.41	2.78	204.19			EPL
214.98	1118	11.18	203.80	0.35	204.15			LV INV
214.98	1133	15.77	199.21	4.72	203.93			BPL
214.98	1160	15.26	199.72	4.26	203.98			EPL
214.98	1200	11.99	202.99	1.00	203.99			HOR
214.98	1240	11.63	203.35	0.63	203.98			RIF
214.98	1275	11.60	203.38	0.53	203.91	4.85	210.13	TOR
214.98	1329	11.63	203.35	0.57	203.92			LV INV
214.98	1335	14.88	200.10	3.79	203.89			BPL
214.98	1353	16.64	198.34	5.56	203.90			EPL
213.73	1372	9.92	203.81	0.15	203.96			RCV INV
213.73	1380	12.40	201.33	2.42	203.75			BPL
213.73	1395	11.65	202.08	1.71	203.79			EPL
213.73	1403	10.06	203.67	0.10	203.77			LV INV
213.73	1412	12.85	200.88	2.79	203.67			BPL
213.73	1437	12.47	201.26	2.39	203.65			XS-5
213.73	1470	10.57	203.16	0.47	203.63	4.48	209.25	HOR
213.73	1545	10.87	202.86	0.66	203.52			LV INV
213.73	1560	14.53	199.20	4.37	203.57			BPL
213.73	1567	14.63	199.10	4.66	203.76			XS-6
213.73	1582	10.58	203.15	0.38	203.53			LV INV
213.73	1590	12.67	201.06	2.48	203.54			BPL
213.73	1605	13	200.73	2.79	203.52			EPL
213.73	1650	10.81	202.92	0.60	203.52	5.51	208.22	HOR
213.73	1730	11.12	202.61	0.66	203.27			LV INV
213.73	1747	14.88	198.85	4.40	203.25			BPL
213.73	1790	13	200.73	2.54	203.27			EPL
213.17	1810	10.47	202.70	0.53	203.23			LV INV
213.17	1825	14.03	199.14	4.09	203.23			BPL
213.17	1847	12.69	200.48	2.73	203.21			EPL
213.17	1858	10.7	202.47	0.73	203.20			LV INV
213.17	1869	11.37	201.80	1.40	203.20			PL
213.17	1885	10.55	202.62	0.54	203.16	5.73	207.44	HOR
213.17	1980	11.07	202.10	0.77	202.87			TOR
213.17	2015	10.87	202.30	0.52	202.82			LV INV
213.17	2025	13.63	199.54	3.30	202.84			BPL
213.17	2041	13.65	199.52	3.29	202.81			EPL
213.17	2072	11.36	201.81	1.00	202.81			LV INV
213.17	2089	12.79	200.38	2.42	202.80			BPL
213.17	2117	12.75	200.42	2.38	202.80			EPL
213.17	2145	11	202.17	0.61	202.78			HOR
213.17	2161	11.45	201.72	1.00	202.72			EP3

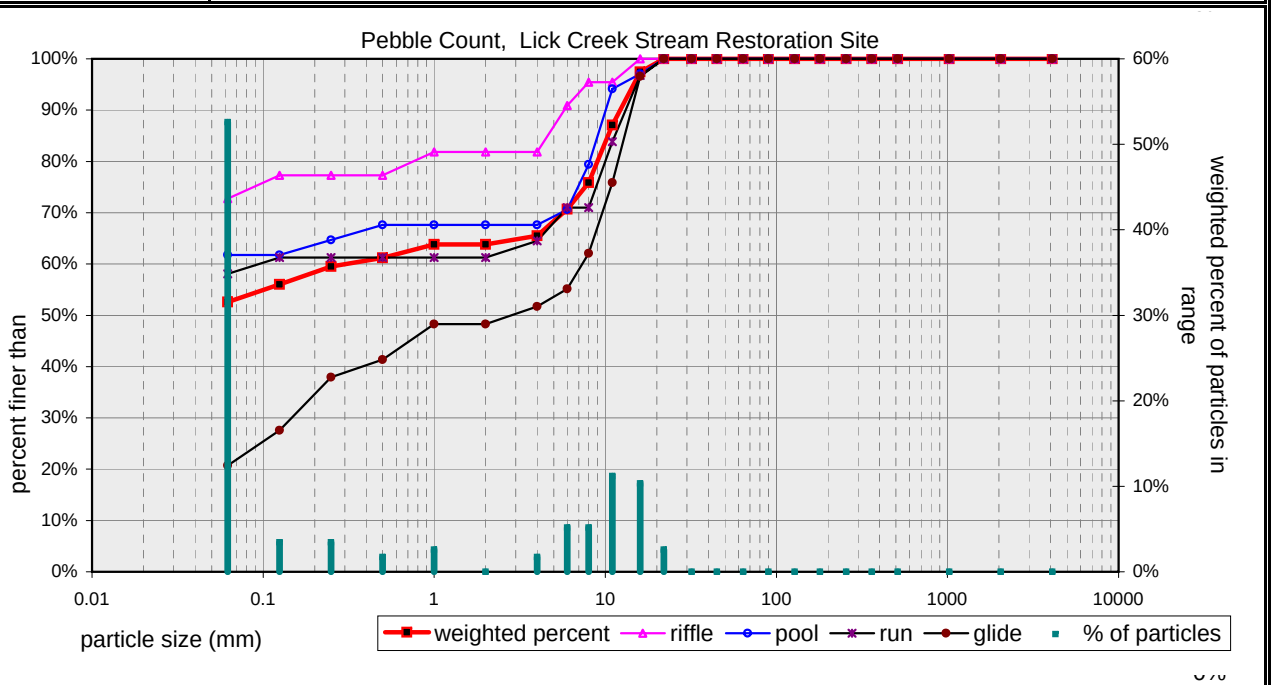
Pebble Count Weighted by Channel Feature

Percent Riffle:	**18.97**	Percent Run:	**26.72**	
Percent Pool:	**29.31**	Percent Glide:	**25**	Pebble Count,

Material	Size Range (mm)		weighted	
silt/clay	0	0.062	52.6	#
very fine sand	0.062	0.13	3.4	#
fine sand	0.13	0.25	3.4	#
medium sand	0.25	0.5	1.7	#
coarse sand	0.5	1	2.6	#
very coarse sand	1	2	0.0	#
very fine gravel	2	4	1.7	#
fine gravel	4	6	5.2	#
fine gravel	6	8	5.2	#
medium gravel	8	11	11.2	#
medium gravel	11	16	10.3	#
coarse gravel	16	22	2.6	#
coarse gravel	22	32	0.0	#
very coarse gravel	32	45	0.0	#
very coarse gravel	45	64	0.0	#
small cobble	64	90	0.0	#
medium cobble	90	128	0.0	#
large cobble	128	180	0.0	#
very large cobble	180	256	0.0	#
small boulder	256	362	0.0	#
small boulder	362	512	0.0	#
medium boulder	512	1024	0.0	#
large boulder	1024	2048	0.0	#
very large boulder	2048	4096	0.0	#
weighted particle count:			100.0	

bedrock		0.0
clay hardpan		0.0
detritus/wood		0.0
artificial		0.0
weighted total count:		100

Lick Creek Stream Restoration Site
Lee County, NC
Year 4
Note: **Reach 1** 53%



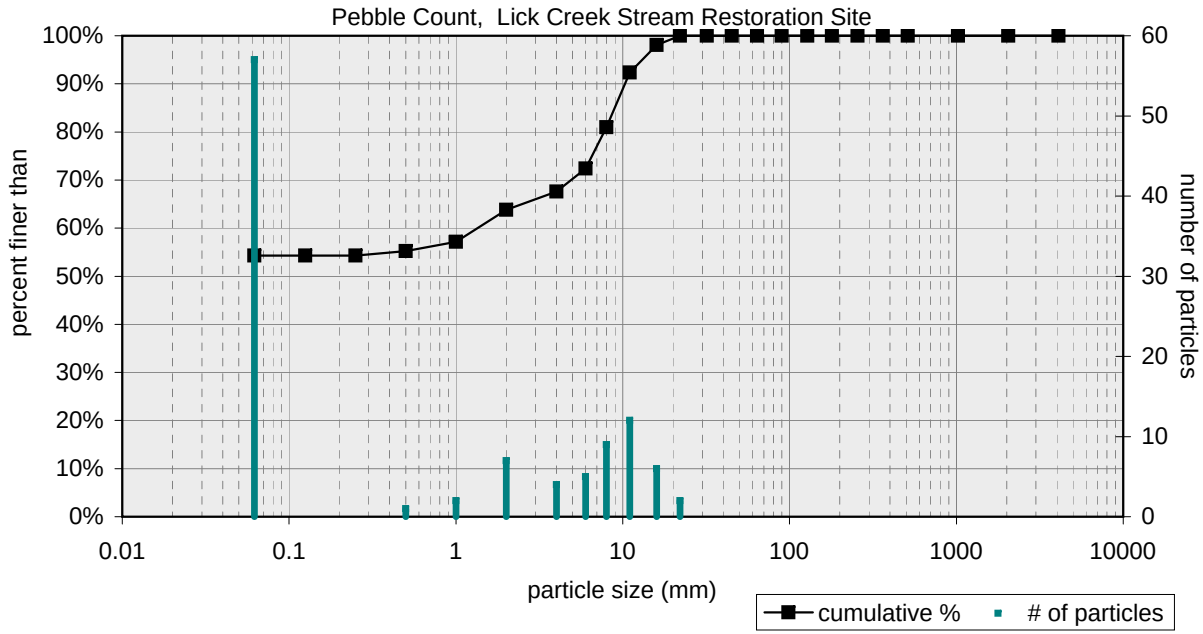
based on	size percent less than (mm)						particle size distribution		
sediment	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
particles only	0.062	0.06	0.1	3	10	15	81.8	0.8	12.8

based on	percent by substrate type								
total count	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	53%	11%	36%	0%	0%	0%	0%	0%	0%

Pebble Count of Channel Reach

Pebble Count,
Lick Creek Stream Restoration Site
Lee County, NC
Year 4
Note: **Reach 1 - Wallace Branch**

Material	Size Range (mm)		Count	
silt/clay	0	0.062	**57**	##
very fine sand	0.062	0.13		##
fine sand	0.13	0.25		##
medium sand	0.25	0.5	**1**	##
coarse sand	0.5	1	**2**	##
very coarse sand	1	2	**7**	##
very fine gravel	2	4	**4**	##
fine gravel	4	6	**5**	##
fine gravel	6	8	**9**	##
medium gravel	8	11	**12**	##
medium gravel	11	16	**6**	##
coarse gravel	16	22	**2**	##
coarse gravel	22	32		##
very coarse gravel	32	45		##
very coarse gravel	45	64		##
small cobble	64	90		##
medium cobble	90	128		##
large cobble	128	180		##
very large cobble	180	256		##
small boulder	256	362		##
small boulder	362	512		##
medium boulder	512	1024		##
large boulder	1024	2048		##
very large boulder	2048	4096		##
	total particle count:		105	



bedrock			
clay hardpan			
detritus/wood			
artificial			
	total count:	105	

based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	0.062	0.06	0.1	2	9	13	70.7	0.7	11.9

based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	54%	10%	36%	0%	0%	0%	0%	0%	0%

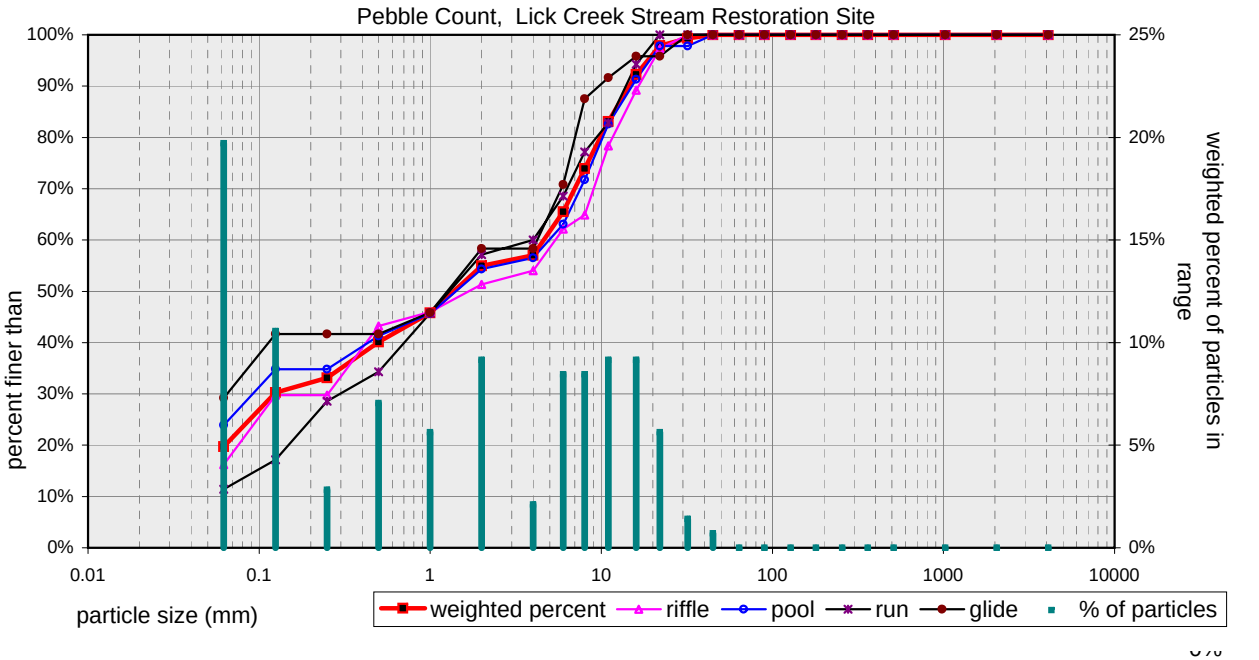
Pebble Count Weighted by Channel Feature

Percent Riffle:	**26.06**	Percent Run:	**24.65**
Percent Pool:	**32.39**	Percent Glide:	**16.9**

Pebble Count,
Lick Creek Stream Restoration Site
Lee County, NC
Year 4
Note: **Reach 2** 20%

Material	Size Range (mm)		weighted	
silt/clay	0	0.062	19.7	#
very fine sand	0.062	0.13	10.6	#
fine sand	0.13	0.25	2.8	#
medium sand	0.25	0.5	7.0	#
coarse sand	0.5	1	5.6	#
very coarse sand	1	2	9.2	#
very fine gravel	2	4	2.1	#
fine gravel	4	6	8.5	#
fine gravel	6	8	8.5	#
medium gravel	8	11	9.2	#
medium gravel	11	16	9.2	#
coarse gravel	16	22	5.6	#
coarse gravel	22	32	1.4	#
very coarse gravel	32	45	0.7	#
very coarse gravel	45	64	0.0	#
small cobble	64	90	0.0	#
medium cobble	90	128	0.0	#
large cobble	128	180	0.0	#
very large cobble	180	256	0.0	#
small boulder	256	362	0.0	#
small boulder	362	512	0.0	#
medium boulder	512	1024	0.0	#
large boulder	1024	2048	0.0	#
very large boulder	2048	4096	0.0	#
weighted particle count:			100.0	

bedrock		0.0
clay hardpan		0.0
detritus/wood		0.0
artificial		0.0
weighted total count:		100



based on	size percent less than (mm)						particle size distribution		
sediment	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
particles only	0.062	0.30	1.4	6	11	19	15.2	0.8	13.6

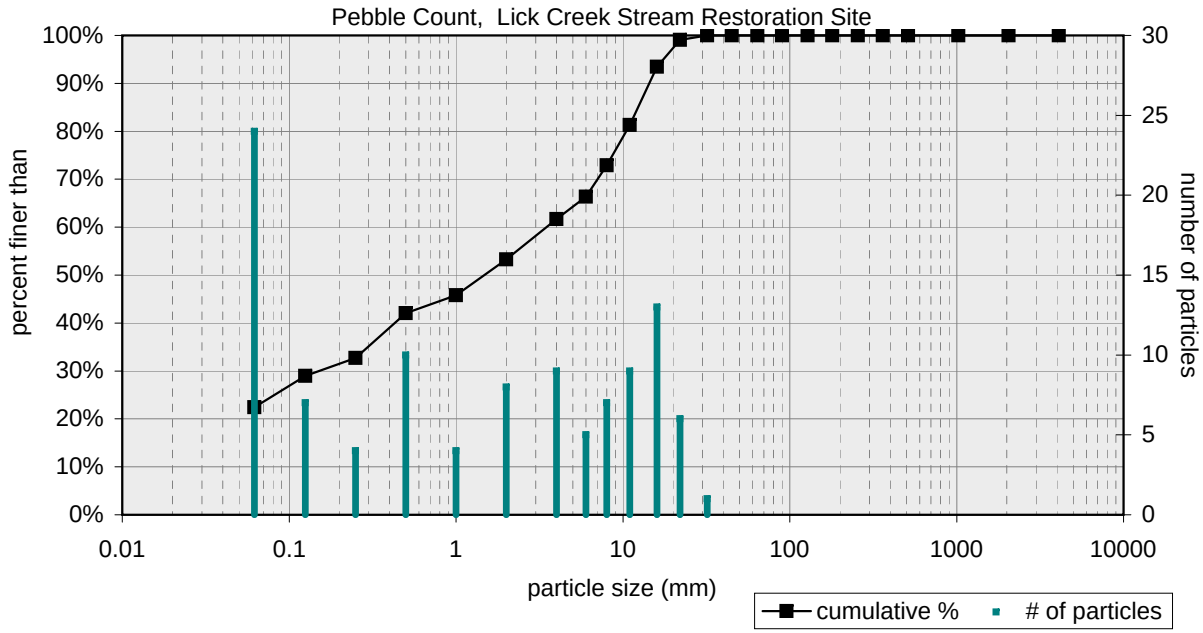
based on	percent by substrate type								
total count	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	20%	35%	45%	0%	0%	0%	0%	0%	0%

Pebble Count of Channel Reach

Material	Size Range (mm)		Count	
silt/clay	0	0.062	**24**	##
very fine sand	0.062	0.13	**7**	##
fine sand	0.13	0.25	**4**	##
medium sand	0.25	0.5	**10**	##
coarse sand	0.5	1	**4**	##
very coarse sand	1	2	**8**	##
very fine gravel	2	4	**9**	##
fine gravel	4	6	**5**	##
fine gravel	6	8	**7**	##
medium gravel	8	11	**9**	##
medium gravel	11	16	**13**	##
coarse gravel	16	22	**6**	##
coarse gravel	22	32	**1**	##
very coarse gravel	32	45		##
very coarse gravel	45	64		##
small cobble	64	90		##
medium cobble	90	128		##
large cobble	128	180		##
very large cobble	180	256		##
small boulder	256	362		##
small boulder	362	512		##
medium boulder	512	1024		##
large boulder	1024	2048		##
very large boulder	2048	4096		##
	total particle count:		107	

bedrock		
clay hardpan		
detritus/wood		
artificial		
	total count:	107

Pebble Count,
Lick Creek Stream Restoration Site
Lee County, NC
Year 4
Note: **Reach 2 - Lick Creek**



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	0.062	0.30	1.5	5	12	17	16.0	0.9	13.9

based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	22%	31%	47%	0%	0%	0%	0%	0%	0%

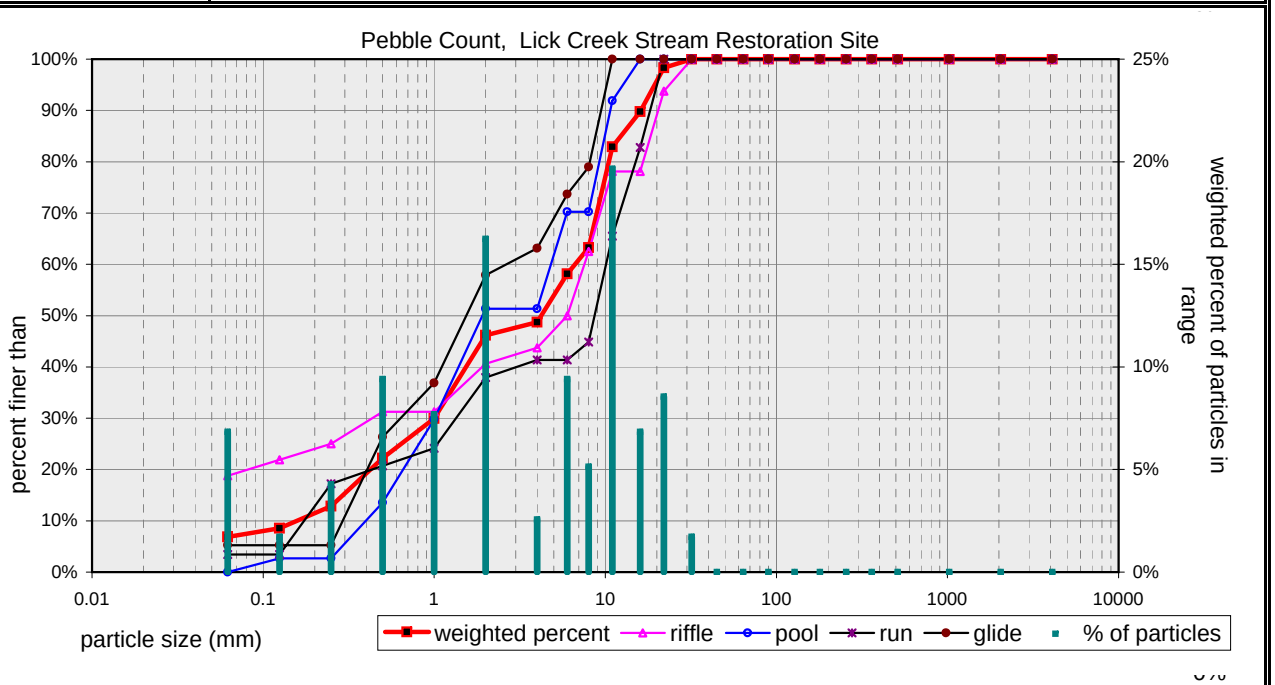
Pebble Count Weighted by Channel Feature

Percent Riffle:	**27.35**	Percent Run:	**24.79**	
Percent Pool:	**31.62**	Percent Glide:	**16.24**	Pebble Count,

Material	Size Range (mm)		weighted	
silt/clay	0	0.062	6.8	#
very fine sand	0.062	0.13	1.7	#
fine sand	0.13	0.25	4.3	#
medium sand	0.25	0.5	9.4	#
coarse sand	0.5	1	7.7	#
very coarse sand	1	2	16.2	#
very fine gravel	2	4	2.6	#
fine gravel	4	6	9.4	#
fine gravel	6	8	5.1	#
medium gravel	8	11	19.7	#
medium gravel	11	16	6.8	#
coarse gravel	16	22	8.5	#
coarse gravel	22	32	1.7	#
very coarse gravel	32	45	0.0	#
very coarse gravel	45	64	0.0	#
small cobble	64	90	0.0	#
medium cobble	90	128	0.0	#
large cobble	128	180	0.0	#
very large cobble	180	256	0.0	#
small boulder	256	362	0.0	#
small boulder	362	512	0.0	#
medium boulder	512	1024	0.0	#
large boulder	1024	2048	0.0	#
very large boulder	2048	4096	0.0	#
weighted particle count:			100.0	

bedrock		0.0
clay hardpan		0.0
detritus/wood		0.0
artificial		0.0
weighted total count:		100

Lick Creek Stream Restoration Site
Lee County, NC
Year 4
Note: **Reach 3** 7%



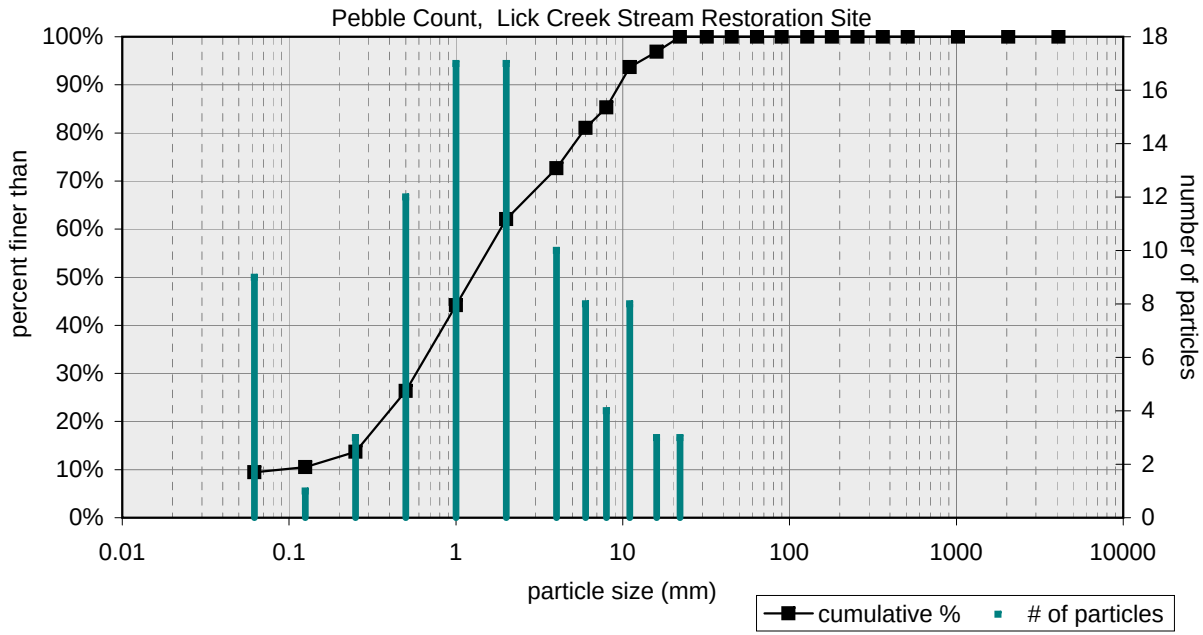
based on	size percent less than (mm)						particle size distribution		
sediment	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
particles only	0.316	1.24	4.2	8	12	19	8.1	1.9	6.1

based on	percent by substrate type								
total count	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	7%	39%	54%	0%	0%	0%	0%	0%	0%

Pebble Count of Channel Reach

Pebble Count,
Lick Creek Stream Restoration Site
Lee County, NC
Year 4
Note: **Reach 3 - Lick Creek**

Material	Size Range (mm)		Count	
silt/clay	0	0.062	**9**	##
very fine sand	0.062	0.13	**1**	##
fine sand	0.13	0.25	**3**	##
medium sand	0.25	0.5	**12**	##
coarse sand	0.5	1	**17**	##
very coarse sand	1	2	**17**	##
very fine gravel	2	4	**10**	##
fine gravel	4	6	**8**	##
fine gravel	6	8	**4**	##
medium gravel	8	11	**8**	##
medium gravel	11	16	**3**	##
coarse gravel	16	22	**3**	##
coarse gravel	22	32		##
very coarse gravel	32	45		##
very coarse gravel	45	64		##
small cobble	64	90		##
medium cobble	90	128		##
large cobble	128	180		##
very large cobble	180	256		##
small boulder	256	362		##
small boulder	362	512		##
medium boulder	512	1024		##
large boulder	1024	2048		##
very large boulder	2048	4096		##
	total particle count:		95	



bedrock		
clay hardpan		
detritus/wood		
artificial		
	total count:	95

based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	0.284	0.70	1.3	2	7	13	5.1	1.4	5.1

based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	9%	53%	38%	0%	0%	0%	0%	0%	0%