

# Little River Farm Site – Stream Enhancement, Restoration, and Preservation Project Final Year 2 Monitoring Report (2011) Montgomery County, North Carolina

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EEP Contract Number 000623



Submitted to/prepared for:



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**Little River Farm Site – Stream Enhancement,  
Restoration, and Preservation Project  
Final Year 2 Monitoring Report (2011)  
Montgomery County, North Carolina**

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## **1.0 EXECUTIVE SUMMARY**

This Annual Report details the monitoring activities during the 2011 growing season on the Little River Farm Stream Restoration site. Construction of the site, including the planting of woody and herbaceous vegetation and native grasses was completed in the winter of 2009/2010. In order to document project success, 17 vegetation monitoring plots, 2 permanent cross-sections, 515 linear feet (LF) of longitudinal profile, and 1 crest gauge were installed and assessed across the site. The 2011 data represents results from the second year of vegetation and hydrologic monitoring.

Historically, the site has been used for cattle and hog farming, as forest land, and as a rock quarry. The existing stream channels, located north of Black Ankle Road, were relatively stable but each reach was experiencing some channel degradation due to unrestricted cattle access. Unnamed Tributary (UT) 4 experienced the highest rate of erosion and overall degradation, due to an almost complete lack of riparian buffer and subsequent channel incision. Vegetation within the site was comprised of a combination of pasture and wooded areas. Upon completion of construction, it was determined that 515 LF of an unnamed tributary to Little River was restored, 11,029 LF of stream was enhanced, and 2,409 LF of stream was preserved along Little River and its four UTs (UT1, UT2, UT3, and UT4). In addition, 1,076 LF of Little River was enhanced on the right floodplain only; however, mitigation credit was not sought for this reach. Approximately 36.8 acres (AC) of associated riparian buffer were restored and/or enhanced within the site, while a conservation easement consisting of 44.5 AC was implemented to protect all stream reaches and riparian buffers in perpetuity.

The 17 vegetation monitoring plots are 100 square meters in size and are used to assess survivability of the woody vegetation planted on site. They are located to represent the different zones within the project as directed by EEP monitoring guidance. The vegetation monitoring indicated a survivability range of 202 stems per acre to 607 stems per acre with an overall average of 474 stems per acre.

In general, dimension, pattern, profile and in-stream structures remained stable during the second growing season. One bankfull event was documented during 2011.

## **2.0 PROJECT GOALS, BACKGROUND, & ATTRIBUTES**

### **2.1 Project Location and Description**

The site is located in Montgomery County, NC (Figure 1, Appendix A) approximately three miles south of the Town of Seagrove and just east of the US-220 Bypass. The site is part of the Yadkin River Basin within NCDWQ sub-basin 03-07-15 and USGS hydrologic unit 03040104-030010.

The site is part of the Piedmont physiographic province and is located in an area of metavolcanic rocks; mainly felsic metavolcanic rocks of the Carolina Slate Belt (Geologic Map of North Carolina, NC Geological Survey, 1998). According to the Natural Resources Conservation Service (NRCS) in Montgomery County, soils found on site are primarily Herndon silt loam and Badin-Tarrus complex, with minor amounts of Georgeville silt loam and State silt loam. Badin soils are moderately deep and well drained and comprise the majority of the riparian corridor and floodplain along Little River, UT2, and UT4. The Herndon silt loam series are very deep, well drained soils and comprise the majority of the riparian corridor and floodplain in the project area along UT1 and UT3 (NRCS, 1930).

Little River drains approximately 51 square miles of predominately agricultural lands, while each of its tributaries, within the project boundaries, drain less than one square mile. Little River flows south through

the project area and continues to its confluence with the Yadkin-Pee Dee River system. UT1 and UT4 flow southwest to Little River, while UT2 and UT3 flow northeast to Little River.

To access the site, travel west on US-64 from Raleigh to Asheboro. Take the US-220 South Bypass from Asheboro to the Black Ankle Road Exit (Exit 41). Turn west on Black Ankle Road. Black Ankle Road bisects the Little River reach of the project site.

## **2.2 Restoration Summary**

### **2.2.1 Mitigation Goals and Objectives**

The specific goals of this project include the enhancement of existing riparian buffer vegetation and the reforestation of the floodplain with native species along Little River and its four UTs within the conservation easement to:

- Maintain and increase channel bank stability,
- Reduce sedimentation,
- Filter and reduce pollutants, and
- Provide increased habitat for aquatic and terrestrial wildlife.

The primary goals for the project were implemented by addressing areas of bank erosion and stream instability on UT4 and UT2, implementing and improving equipment and cattle crossings throughout the property, preserving plant community assemblages, and enhancing and restoring native riparian vegetation. Water quality improvements were made by fencing cattle out of the project reaches and by reducing bank erosion throughout the site. Aquatic habitat was improved by providing in-stream habitat structures. A conservation easement, along Little River and its UTs, has been implemented and lies within a fenced boundary on the site.

### **2.2.2 Project Description and Restoration Approach**

The project involved restoration of 515 LF of UT4 and enhancement and preservation of 11,029 LF and 2,409 LF, respectively, along Little River and its four UTs (UT1, UT2, UT3, and UT4). As a result of this project, a total of 5,326 Stream Mitigation Units (SMUs) are to be generated. No credit is being sought for the work done between UT3A and UT3. The work conducted in this section of the site was funded as part of a NC Clean Water Management Trust Fund (CWMTF) Grant.

Approximately 36.8 AC of associated riparian buffer were restored/enhanced through the planting of native riparian vegetation and the removal of invasive species. A conservation easement consisting of 44.5 AC will protect all stream reaches and riparian buffers in perpetuity.

For analysis purposes, Baker divided the Little River, UT1, UT2 UT3, and UT4 into seven reaches (As-built Plan Sheets, Appendix D). The Little River flows from north to south entering the site at the northern property line. Little River was divided into two reaches “M1” and “M2”. “M1” begins at the northern property line and ends at Black Ankle Road. “M2” begins south of Black Ankle Road and continues to the site’s southern property line. UT1 flows northeast to southwest entering the site along the northern property line and ending at its confluence with Little River. UT2 flows west to east starting along the western edge of the property and ending at its confluence with Little River. UT3 flows west to east and is separated mid-reach by a series of ponds. The portion of stream from the western property line to the upstream extent of the ponds is UT3A. Below the ponds to its confluence with Little River, the channel is referred to as UT3. UT4 flows east to west starting at the eastern property line and ending at its confluence with Little River.

Baker performed visual stability assessments throughout the site. All streams within the site were partially degraded due to a lack of riparian buffer and unrestricted cattle access. Run-off containing

nutrients and fecal loadings from cattle were major water quality impacts to the system. Based on field observations, the reaches targeted for enhancement and preservation were classified as “E,” “B”, or “C” stream types as defined by the Rosgen (1994, 1996) stream classification method. Bank height ratios rarely exceed 1.2 and most channels appear to be fairly stable.

However, UT4 was an exception. UT4 is an intermittent tributary that receives run-off from the US-220 Bypass. The reach consisted of a high angled slope and eroding banks and lacked a riparian buffer. Prior to restoration, the stream was highly incised with bank height ratios around 2.0, and classified as a Rosgen G-type channel.

The area between reaches UT3A and UT3 originally ran through a series of ponds and lagoons. An adjacent channelized ditch acted as an overflow for the ponds and drains at the upper section of UT3. At the completion of construction of the full delivery project, this section of the farm was excluded from the easement because funding for this portion of the property had not been procured. Additional funding was later received from the NC Division of Water Resources to remove the lagoons and restore the stream. At the submittal of this Year 2 report, the lagoons have been removed and construction is complete on the restored section of stream which connects UT3A and UT3. Currently, the conservation easement is being finalized and will be held in perpetuity. As mentioned, funding of this portion of the project was through the CWMTF Grant; subsequently, no credit is being sought for the work conducted between reaches UT3A and UT3.

UT4 was restored to a B-type channel due to its slope and position in the landscape. The restoration approach for the upstream section of UT4 adjusted the pattern of the stream slightly, stabilized the stream banks, implemented grade control structures, provided floodplain access, and restored aquatic habitat. The design criteria were derived from the monitoring and evaluation of restored B-type channels and composite reference reach data.

The remaining reaches were relatively stable, with only minor areas of bank instability, usually associated with cattle access paths, past modifications, or loss of riparian buffer. Therefore, the majority of work involved excluding cattle from the streams, re-establishing 50-foot riparian buffers along all reaches, installing improved cattle/farm crossings, and stabilizing areas of localized bank erosion.

Permanent conservation easements have been established along each project reach to restrict cattle access to the stream. The easement boundaries were fenced and areas inside the easements were planted unless a mature tree canopy already existed. Watering tanks fed by well water are located in several of the pastures, and additional watering tanks were installed as part of this project, so that cattle no longer need to access the streams for drinking water.

Four improved stream crossings were installed as part of the project. One crossing was installed on each of the four UTs (UT1, UT2, UT3A, and UT4). Three culvert crossings were installed (UT1, UT2, and UT3A), such that cattle and farm machinery no longer enter the stream channels when crossing. The UT4 crossing is an improved ford crossing.

Minor areas of bank erosion were stabilized by grading the banks to a 2:1 bank angle ratio and applying coir fiber matting, permanent seeding, and live staking. Cross vanes were used throughout the upstream section of UT4 to control streambed grade, reduce stream bank stress, and promote bedform sequences and habitat diversity. The site, with the exception of the riparian zone around UT4, was planted with native vegetation in the late winter/early spring of 2009 as shown in Table 2. Buffer planting along UT4 was completed during January 2010. All planted areas are protected, in perpetuity, through a permanent conservation easement. Table 1 provides a summary of the project approach depicted in Figure 3 in Appendix A.

**Table 1. Project Mitigation Approach****Little River Farm Site: Project No. 000623**

<b>Project Segment or Reach ID</b>	<b>Restoration Plan Feet/Acres*</b>	<b>Mitigation Type</b>	<b>Approach</b>	<b>As-Built Linear Footage or Acreage*</b>	<b>Mitigation Ratio</b>	<b>Mitigation Units</b>	<b>Stationing</b>	<b>Comment</b>
Little River - M1	4,089	E	EII	4,103	1:2.5	1,641	10+00 to 40+44 40+94 to 47+49 58+25 to 62+29	A 50-foot planted buffer was placed within a conservation easement. Cattle were excluded from the conservation easement by fencing. The right floodplain was enhanced from 47+49 to 58+25; however, mitigation credit is not being sought.
Little River - M2	2,435	P	P	2,409	1:5	482	63+18 to 65+87 66+12 to 87+52	Preservation.
UT1	2,101	E	EII	2,120	1:2.5	848	10+00 to 16+88 17+19 to 31+51	A 50-foot planted buffer was placed within a conservation easement. Cattle were excluded from the conservation easement by fencing. The existing farm crossing (outside the easement) was stabilized.
UT2	2,402	E	EII	2,371	1:2.5	948	10+00 to 25+37 26+18 to 34+52	Two unstable meander bends were sloped and stabilized. A 50-foot planted buffer was placed within a conservation easement. Cattle were excluded from the conservation easement by fencing. The existing farm crossing (outside the easement) was stabilized.
UT3A	1,455	E	EII	1,449	1:2.5	580	10+00 to 18+36 18+92 to 25+05	A 50-foot planted buffer was placed within a conservation easement. Cattle were excluded from the conservation easement by fencing. The existing farm crossing (outside the easement) was stabilized.
UT3	719	E	EII	719	1:2.5	288	10+00 to 17+19	A 50-foot planted buffer was placed within a conservation easement. Cattle were excluded from the conservation easement by fencing.



<b>Table 1. Project Mitigation Approach</b>								
<b>Little River Farm Site: Project No. 000623</b>								
<b>Project Segment or Reach ID</b>	<b>Restoration Plan Feet/Acres*</b>	<b>Mitigation Type</b>	<b>Approach</b>	<b>As-Built Linear Footage or Acreage*</b>	<b>Mitigation Ratio</b>	<b>Mitigation Units</b>	<b>Stationing</b>	<b>Comment</b>
UT4	550	R	P2	515	1:1	515	10+00 to 15+15	Installed in-stream structures to control grade and reduce bank erosion. Re-established stable pattern and profile. A 50-foot planted buffer was placed within a conservation easement. Cattle were excluded from the conservation easement by fencing. The existing farm crossing (outside the conservation easement) was stabilized.
UT4	242	E	EII	267	1:2.5	107	15+66 to 18+33	A 50-foot planted buffer was placed within a conservation easement. Cattle were excluded from the conservation easement by fencing.
SUM						5,409		
*Lengths exclude breaks in easement for farm crossings. R = Restoration                      P1 = Priority I                      EII = Enhancement II E = Enhancement                      P2 = Priority II                      P = Preservation								

<b>Table 1. Project Mitigation Approach</b>						
<b>Little River Farm Site: Project No. 000623</b>						
<b>Component Summations</b>						
<b>Restoration Level</b>	<b>Stream (LF)</b>	<b>Riparian Wetland (Ac)</b>		<b>Non-Ripar (Ac)</b>	<b>Upland (Ac)</b>	<b>Buffer (Ac)</b>
		<b>Riverine</b>	<b>Non-Riverine</b>			
Restoration	515					
Enhancement						
Enhancement I						
Enhancement II	11,029					
Creation						
Preservation	2,409					
HQ Preservation						
<b>Totals</b>	<b>13,953</b>					44.53**
	= Non-Applicable					

\*\*Value indicates total acreage within the established easement

### 2.2.3 Project History, Contacts, and Attribute Data

The Little River Farm site was restored by Baker through a full delivery contract with NCEEP. The chronology of the Little River Stream Enhancement, Restoration, and Preservation Project is presented in Table 2. The contact information for all designers, contractors, and relevant suppliers is presented in Table 3. Relevant project background information is presented in Table 4.

<b>Table 2. Project Activity and Reporting History</b>			
<b>Little River Farm Site: Project No. 000623</b>			
<b>Activity or Report</b>	<b>Scheduled Completion</b>	<b>Data Collection Complete</b>	<b>Actual Completion or Delivery</b>
Restoration Plan Prepared	N/A	N/A	Mar-09
Restoration Plan Amended	N/A	N/A	Mar-09
Restoration Plan Approved	N/A	N/A	Mar-09
Final Design – (at least 90% complete)	N/A	N/A	Mar-09
Construction Begins	N/A	N/A	Mar-09
Temporary S&E mix applied to entire project area	NA	N/A	Jul-09
Permanent seed mix applied to entire project area	N/A	N/A	Jul-09
Planting of live stakes	N/A	N/A	N/A
Planting of bare root trees – UT4	N/A	N/A	Jan-10
Planting of bare root trees – Little River M1, UT1, UT2, UT3A, UT4	N/A	N/A	Apr-09
End of Construction	N/A	N/A	Jul-10
Survey of As-built conditions (Year 0 Monitoring-baseline)	N/A	Feb-09	Oct-09
Year 1 Monitoring	Dec-10	Nov-10	Dec-10
Year 2 Monitoring	Dec-11	Mar-12	Dec-11
Year 3 Monitoring	Scheduled Dec-12	Scheduled Nov-12	N/A
Year 4 Monitoring	Scheduled Dec-13	Scheduled Nov-13	N/A
Year 5 Monitoring	Scheduled Dec-14	Scheduled Nov-14	N/A

<b>Table 3. Project Contacts</b>	
<b>Little River Farm Site: Project No. 000623</b>	
<b>Designer</b>	<p>Michael Baker Engineering, Inc.                      8000 Regency Parkway, Suite 200 Cary, NC 27518</p> <p><u>Contact:</u> Kevin Tweedy, Tel. 919-463-5488</p>
<b>Construction Contractor</b>	<p>River Works, Inc.                                      8000 Regency Parkway, Suite 200 Cary, NC 27518</p> <p><u>Contact:</u> Will Pedersen, Tel. 919-459-9001</p>

<b>Table 3. Project Contacts</b>	
<b>Little River Farm Site: Project No. 000623</b>	
<b>Planting Contractor</b>	
River Works, Inc.	8000 Regency Parkway, Suite 200 Cary, NC 27518  <u>Contact:</u> Will Pedersen, Tel. 919-459-9001
<b>Seeding Contractor</b>	
River Works, Inc.	8000 Regency Parkway, Suite 200 Cary, NC 27518  <u>Contact:</u> Will Pedersen, Tel. 919-459-9001
<b>Seed Mix Sources</b>	
	Green Resources, Greensboro, NC Tel. 336-855-6363 Arbor Gen Blenheim, SC, Tel. 843-528-3204
<b>Nursery Stock Suppliers</b>	
	Mellow Marsh Farm, Silk Hope, NC, Tel. 919-742-1800
<b>Monitoring Performers</b>	
Michael Baker Engineering, Inc.	5550 Seventy-Seven Center Drive, Suite 320 Charlotte, NC 28217  <u>Contact:</u>
Stream Monitoring Point of Contact:	Ian Eckardt, Tel. 704-665-2200
Vegetation Monitoring Point of Contact:	Ian Eckardt, Tel. 704-665-2200

<b>Table 4. Project Background</b>	
<b>Little River Farm Site: Project No. 000623</b>	
Project County:	Montgomery, NC
<b>Drainage Area:</b>	
Little River M1	50.42 mi <sup>2</sup>
Little River M2	51.03 mi <sup>2</sup>
UT1	0.68 mi <sup>2</sup>
UT2	0.16 mi <sup>2</sup>
UT3A	0.1 mi <sup>2</sup>
UT3	0.16 mi <sup>2</sup>
UT4	0.03 mi <sup>2</sup>
UT4	0.03 mi <sup>2</sup>
<b>Estimated Drainage % Impervious Cover:</b>	
Little River M1	N/A
Little River M2	N/A
UT1	N/A
UT2	N/A
UT3A	N/A
UT3	N/A
UT4	N/A
UT4	N/A
<b>Stream Order:</b>	
Little River M1	5th

<b>Table 4. Project Background</b>	
<b>Little River Farm Site: Project No. 000623</b>	
Little River M2	5th
UT1	3rd
UT2	2nd
UT3A	1st
UT3	2nd
UT4	1st
UT4	1st
Physiographic Region:	Piedmont
Ecoregion:	Carolina Slate Belt Level IV
Rosgen Classification of As-Built:	
Little River M1	E/B/C
Little River M2	E/B/C
UT1	E/B/C
UT2	E/B/C
UT3A	E/B/C
UT3	E/B/C
UT4	B4
UT4	E/B/C
Cowardin Classification	Riverine, Upper Perennial, Unconsolidated Bottom, Cobble-Gravel
Dominant Soil Types	
Little River M1	Hd, StB, BdD
Little River M2	GhC, GmE
UT1	Hd, BdD
UT2	BdD
UT3A	Hd
UT3	Hd, BdD
UT4	BdD
UT4	BdD
Reference site IDs	Silas Creek
USGS HUC for Project and Reference sites	03040105030010(Project); 03040101080010 (Reference)
NCDWQ Sub-basin for Project and Reference	03-07-15 (Project); 03-07-02 (Reference)
NCDWQ classification for Project and Reference	C
Any portion of any project segment 303d listed?	No
Any portion of any project segment upstream of a 303d listed segment?	No
Reasons for 303d listing or stressor?	N/A
% of project easement fenced	83%

(NCDENR, 2006; NRCS, 1930; NC Geological Survey, 1998; Rosgen, 1994 & 1996)

## **3.0 MONITORING PLAN**

Channel stability and vegetation survival will be monitored on the project site. Post-restoration monitoring will be conducted for five years following the completion of construction to document project success. Geomorphic monitoring of stream condition will be completed on UT4 where complete restoration was performed. For all other reaches, photo reference sites and vegetation monitoring will be used to monitor the success of enhancement reaches.

### **3.1 Stream Monitoring**

Geomorphic monitoring of restored stream reach UT4 will be conducted for five years to evaluate the effectiveness of the restoration practices. Monitored stream parameters include bankfull events, stream dimension (cross-sections), profile (longitudinal profile survey), and photographic documentation. For monitoring stream success criteria, two permanent cross-sections, one crest gauge, and 11 photo identification points were established on UT4. The specific locations of these monitoring features are represented on the As-built Plan Sheets in Appendix D.

#### **3.1.1 Bankfull Events**

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

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

#### **3.1.2 Cross-sections**

Two permanent cross-sections were installed along the restored stream reach for UT4, with both locations at riffle cross-sections. Each cross-section was marked on both banks with permanent pins to establish the exact transect used. A common benchmark will be used for cross-sections and consistently used to facilitate easy comparison of year-to-year data. The annual cross-sectional survey will include points measured at all breaks in slope, including top of bank, bankfull, inner berm, edge of water, and thalweg, if the features are present. Cross-sections will be classified using the Rosgen Stream Classification System.

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

#### **3.1.3 Pattern**

Annual measurements taken for the plan view of the site will include sinuosity and meander width ratio. Radius of curvature measurements will be taken on newly constructed meanders for the first

year of monitoring only. Pattern measurements should show little adjustment over the five year monitoring period. If adjustments do occur, they will be evaluated to ensure that the new measurements fall within the quantitative parameters defined for channels of the design stream type.

### **3.1.4 Longitudinal Profile**

A longitudinal profile will be completed annually during each year of the monitoring period along UT4. The profile will be conducted for the entire reach (approximately 515 LF). Measurements will include thalweg, water surface, inner berm, bankfull, and top of low bank. Each of these measurements will be taken at the head of each feature (e.g., riffle, run, pool, glide) and at the maximum pool depth. The survey will be tied to a permanent benchmark.

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

### **3.1.5 Watershed Observations**

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

### **3.1.6 Photo Reference Sites**

Photographs will be used to document restoration success visually, by documenting stability and maturation of riparian vegetation over time. Reference stations will be photographed after construction and for five years following construction. Reference photos will be taken once a year, from a height of approximately five to six feet. Permanent markers will be established to ensure that the same locations (and view directions) on the site are monitored during each monitoring period. For enhancement reaches, photo points will be established in several locations along each reach with the intent of photographing areas of the stream that are representative of the reach. Photo points will also be established for each area of bank stabilization and at stream crossings. Photographs taken at cross sections are provided in Appendix B, while structure photographs are shown in Appendix E.

#### **3.1.6.1 Lateral Reference Photos**

Reference photo transects will be taken at each permanent cross-section. Photographs will be taken of both banks at each cross-section. The survey tape will be centered in the photographs of the bank. The water line will be located in the lower edge of the frame, and as much of the bank as possible will be included in each photo. Photographers will make an effort to consistently document the same view in each photo point over time. Lateral photos should not indicate excessive erosion or continuing degradation of the banks.

#### **3.1.6.2 Structure Photos**

Photographs will be taken at grade control structures along the restored reach of UT4, as well as at stream crossings. Photographs will be used to evaluate channel aggradation or degradation, bank erosion, success of riparian vegetation, and effectiveness of erosion control measures subjectively. The position of each structure photo point is located on the As-built Plan Sheets in Appendix D.

## **3.2 Vegetation Monitoring**

Successful restoration of the vegetation on a mitigation site is dependent upon hydrologic restoration, active planting of preferred canopy species, and volunteer regeneration of the native plant community. To evaluate

vegetation success, vegetation-monitoring quadrants were installed and monitored across the restoration site in accordance with the CVS-NCEEP Protocol for Recording Vegetation, Version 4.1 (Lee, 2007). Seventeen permanent monitoring quadrants have been established within the enhancement and restored areas per Protocol Levels 1 and 2. The number of monitoring plots is based on canopy and understory planting of 20 acres on the north side of Black Ankle Road. Approximately 11 acres of existing forested areas within the enhancement reaches were planted with woody understory vegetation. The existing forested riparian areas within the enhancement and preservation areas do not contain monitoring plots. Monitoring quadrants have been established within the floodplain areas of UT1, UT2, UT3A, UT3, UT4 and the Little River (M1). The size of individual quadrants is 100 square meters for woody tree species. Vegetation monitoring will occur in the fall, prior to the loss of leaves. Individual quadrant data will be provided and will include diameter, height, density, and coverage quantities. Relative values will be calculated, and importance values will be determined. Individual seedlings will be marked such that they can be found in succeeding monitoring years. Mortality will be determined from the difference between the previous year's living, planted seedlings and the current year's living, planted seedlings.

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

The interim measure of vegetative success for the site will be the survival of at least 320, 3-year old, planted woody stems (trees and shrubs) per acre at the end of year three of the monitoring period. The final vegetative success criteria will be the survival of 260, 5-year old, planted woody stems (trees and shrubs) per acre at the end of year five of the monitoring period.

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

### **3.3 Maintenance and Contingency Plan**

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

- Projects without established, woody floodplain vegetation are more susceptible to erosion from floods than those with a mature, hardwood forest.
- Alluvial valley channels with wide floodplains are less vulnerable than confined channels.
- Local wildlife can impact the rate at which the native buffer can be established.
- Wet weather during construction can make accurate channel and floodplain excavations difficult.
- Extreme and/or frequent flooding can cause floodplain and channel erosion.
- Extreme hot, cold, wet, or dry weather during and after construction can limit vegetation growth, particularly temporary and permanent seed.
- The presence and aggressiveness of invasive species can affect the extent to which a native buffer can be established.

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

## **4.0 MONITORING RESULTS – 2011 YEAR 2 - MONITORING DATA**

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

### **4.1 Stream Data**

Second year monitoring dimension and profile data of UT4 were sampled in December 2011. Results from the second year monitoring samples were compared with the as-built data. Permanent cross-sections (with photos) and as-built longitudinal data, as well as the quantitative pre-construction, reference reach, and design data used to determine the restoration approach are provided in Appendix B. The locations of the permanent cross-sections are shown on the As-built Plan Sheets in Appendix D.

#### **4.1.1 Cross-section and Longitudinal Profile Analysis and Monitoring Results**

##### **Cross Sections**

The two (2) permanent cross-sections along the restored portion of UT4 were re-surveyed to document stream dimension at the end of monitoring Year 2. The cross-sections documented that UT4 has experienced little to no change in change geometry within the last year. Portions of the floodplain bench and side slopes along UT4 were regraded and reseeded during Year 2. The maintenance work resulted in slight adjustments in floodplain bench and side slope elevations at both cross-sections.

##### **Longitudinal Profile**

The Year 2 longitudinal profile along UT4 was conducted during December 2011. The entire length (515 LF) was resurveyed along the restored channel. The longitudinal profiles were resurveyed to document stream profile at the end of monitoring Year 2. Pool-to-pool spacing on UT4 has changed very little since the as-built survey. Riffle slopes in these reaches also remained similar to as-built values. Slight aggradation is present in a couple pools, approximately at stations 275 and 370, when compared to as-built profile data. This aggradation is probably due to the natural movement of bed material through the system and should not cause any instability throughout the system; however, it will continue to be assessed in subsequent monitoring years for verification. Due to the absence of water in the channel, the slopes were calculated using bed slope instead of water surface.

The longitudinal profile and a summary of parameters measured are provided in Appendix B.

#### **4.1.2 Stream Problem Areas Plan View**

The constructed sections of stream channel are functioning as designed. During the field review, all rock step pool structures on UT4 were noted as stable. During Year 1 a boulder at Station 13+50 had shifted exposing a small area of bank. The boulder was repaired during Year 2 and has remained stable to date. Minor areas of streambank erosion were noted during the Year 2 field review. These areas appear to be the result of insufficient streambank vegetation and are discussed further in Section 4.3.3.

Visual assessment scores are located in Table 5. Table B.4 in Appendix B has additional data further explaining the visual assessment scores.



<b>Table 5. Visual Morphological Stability Assessment</b>						
<b>Little River Farm Site: Project No. 000623</b>						
<b>UT4 ( 515 LF ) Performance Percentage</b>						
<b>Feature</b>	<b>Initial</b>	<b>MY-01</b>	<b>MY-02</b>	<b>MY-03</b>	<b>MY-04</b>	<b>MY-05</b>
A. Riffles	100%	100%	100%			
B. Pools	100%	100%	100%			
C. Thalweg	100%	100%	100%			
D. Meanders	100%	100%	100%			
E. Bed General	100%	100%	100%			
F. Bank Condition	100%	100%	84%			
G. Vanes / J Hooks etc.	100%	100%	100%			
H. Wads and Boulders	100%	99%	100%			

## 4.2 Hydrology Data

The on-site crest gauge documented the occurrence of one bankfull event during the second year monitoring period. The highest stage recorded during the second year monitoring period was 0.24 feet. Bankfull verification summaries are included in Table 6. The crest gauge location is included in the As-built Plan sheets in Appendix D. Bankfull verification photos are provided in Appendix E.

<b>Table 6. Verification of Bankfull Events</b>					
<b>Little River Farm Site: Project No. 000623</b>					
<b>Location</b>	<b>Date of Data Collection</b>	<b>Date of Occurrence of Bankfull Event</b>	<b>Method of Data Collection</b>	<b>Gage Height (feet)</b>	<b>Photo # (If available)</b>
UT4	12/1/2011	Between 11/1/2010 and 12/1/2011	Crest Gauge	0.24	UT4 CG

## 4.3 Vegetation Data

Bare-root trees and shrubs were planted within the conservation easement. A minimum 50-foot buffer was established along all stream reaches. In general, bare-root vegetation was planted at a target density of 564 stems per acre, in an 8-foot by 8-foot grid pattern. Planting of bare roots and live stakes for the majority of the site was completed in April 2009. At that time only a portion of the riparian zone along UT4 was planted with bare roots to accommodate the construction activities along UT4 which were completed in July 2009. Planting in the riparian zone along UT4 was completed during the winter of 2009/2010.

The restoration plan for the site specifies that the number of quadrants required is based on the CVS-NCEEP monitoring guidance (Lee, 2007). The number of quadrants required was determined using the plot number spreadsheet (07312006-2) provided by NCEEP that captures five percent of the total conservation easement. The sizes of individual quadrants are 100 square meters. A total of 17 vegetation plots were established across the restored site.

Year 1 vegetation monitoring indicated a survivability range of 202 to 688 stems per acre with an overall average of 493 stems per acre. (Note: The overall stems per acre average was miscalculated as 376 trees per acre in the Year 1 monitoring report. The correct Year 1 average stems per acre was 493. The updated stem count information is reflected in Table C.7 of Appendix C.) To ensure that the site will meet both the Year 3 and Year 5 vegetative success criteria and the final year's vegetative success criteria of 320 and 260 stems per acre, respectively, supplemental planting was installed portions of Little River, UT2 and UT4 during late winter of 2011.

No volunteer species were noted in any of the site's vegetation plots, or were too small to verify. If any woody volunteer species are observed in subsequent monitoring years they will be flagged and added to the overall stems per acre assessment of the site.

Year 2 vegetation monitoring indicated a survivability range of 202 to 647 stems per acre. The average Year 2 density of planted bare root stems, based on the data from the 17 monitoring plots, is 474 stems per acre. The site is currently on track to meet both Year 3 and Year 5 vegetative success criteria.

The locations of the vegetation plots are shown on the As-built Plan Sheets in Appendix D. Additional vegetation related information is listed below. Monitoring result tables and photos are located in Appendix C.

#### 4.3.1 Growing Season Precipitation Data

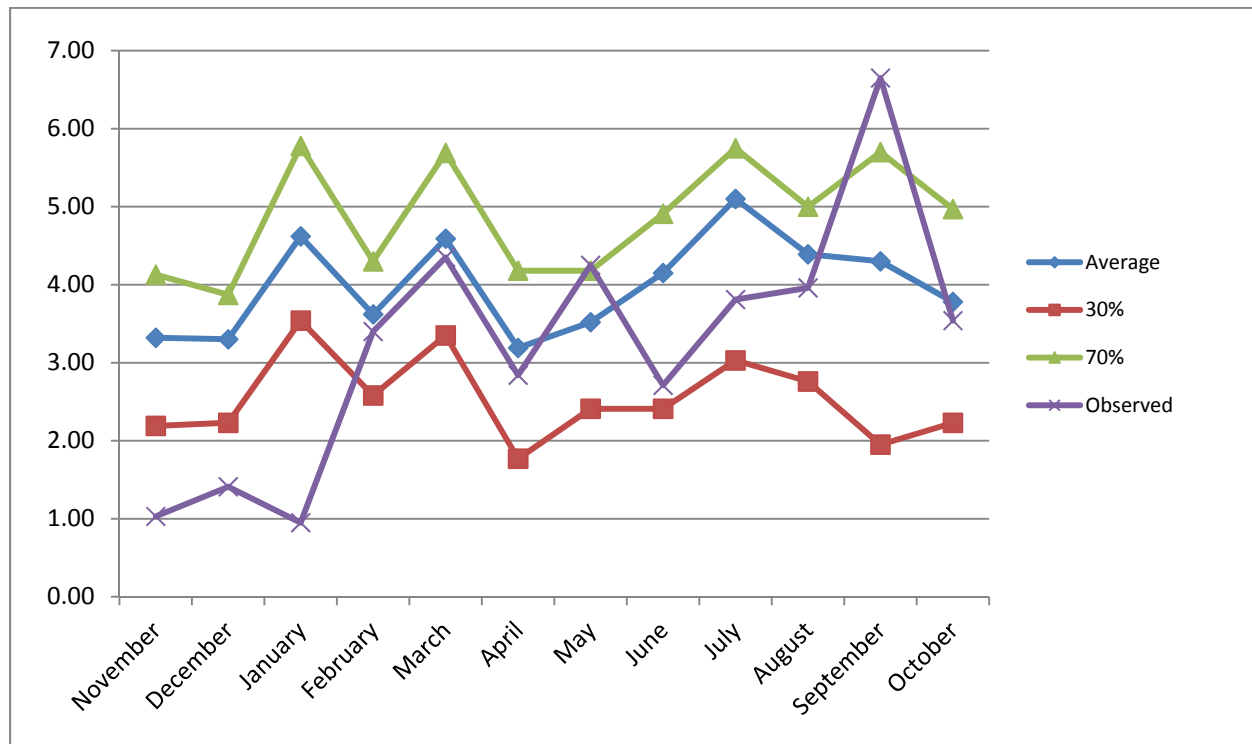
The site experienced drier than normal conditions from November 2010 through October 2011. The observed precipitation was approximately 9 inches below the historic average. Precipitation varied greatly throughout the growing season. Though May and September were considerably wetter than average, June, July and August were significantly drier than average. Lack of consistent rainfall during a plant's growing season can impact its ability to establish its root base; therefore, the root system is still shallow and does not have the capabilities to pull water from ground water reserves. The plant then becomes overly stressed, during times of drought, to degrees from which they cannot fully recover and resulting in mortality. See Table 7 and Chart 1 for a comparison in historic and observed rainfall averages.

<b>Table 7. Comparison of Historic Rainfall to Observed Rainfall</b>				
<b>Little River Creek Farm Site : Project No. 000623</b>				
<b>Month</b>	<b>Average</b>	<b>30%</b>	<b>70%</b>	<b>Observed 2010 - 2011 Precipitation*</b>
November	3.32	2.19	4.13	1.03
December	3.30	2.23	3.87	1.41
January	4.62	3.54	5.78	0.95
February	3.62	2.58	4.30	3.40
March	4.59	3.35	5.69	4.35
April	3.19	1.77	4.18	2.84
May	3.52	2.41	4.18	4.25
June	4.15	2.41	4.91	2.71
July	5.10	3.03	5.75	3.81
August	4.39	2.76	5.00	3.96
September	4.30	1.95	5.70	6.65
October	3.78	2.23	4.97	3.54

(NRCS National Climate and Water Center, 2000 and USGS, 2010-11)

\* Monthly on-site rainfall data unavailable, so total monthly rainfall data was calculated using the nearest USGS rain gauge (USGS 352310080424845 rain gage at Concord, NC Regional Airport) to the project site. (USGS, 2010 & 2011)

**Chart 1. Comparison of Historic Rainfall to Observed 2010-2011 Rainfall**



### 4.3.2 Vegetation Plot Problems

Vegetation plot counts were conducted from November to December 2011. During this assessment, individual planted saplings were noted to be hand-cut in Vegetation Plots 3 and 4. Observations indicate the cutting was in the area adjacent to the fence line associated with the affected vegetation plots. Neither incident should result in a significant loss of vegetation within the project area; however, these areas will be monitored to ensure their recovery and success.

### 4.3.3 Vegetative Problem Areas

During Year 1 several bare areas were present along the floodplain bench and slide slopes of UT4. In addition, a few small erosion rills were noted. These areas were regraded and reseeded during late winter of 2011.

During Year 2 monitoring, small pockets of erosion were noted on the left bank at Stations 11+55 to 11+65, 11+75 to 11+90, and 14+00 to 14+15 and on the right bank at Stations 11+00, 12+10 to 12+31, 12+70 to 12+80, 13+00 to 13+20, 13+65 to 13+80, 14+05 to 14+15, and 14+20 to 14+32. These areas appear to be the result of poorly established streambank vegetation.

Currently, these areas are not posing a threat to channel ability to move sediment through the system and remain stable. However, to ensure the project's vegetative success, maintenance of these areas, such as reseeding and additional woody plant installation, will be implemented within the dormant season of 2012, as needed, and monitored for establishment.

No invasive species were observed within the project site during the field assessment. See Table C.6 in Appendix C for problem area categories, locations, descriptions, causes, and photo log.

### 4.3.4 Vegetative Problem Area Plan View

See Figure C1 in Appendix C for an overview of all vegetative problem areas.

## 4.4 Areas of Concern

Overall the restored channels are functioning as designed with no structural areas of concern. The only areas within the project site with any potential issues of concern are the pockets of streambank erosion along UT4. Reseeding in these areas as well as some additional live stakes and bare root plants are scheduled for completion prior to the onset of the Year 3 growing season. Damaged saplings in Veg Plots 3 and 4 will be monitored.

## 5.0 References

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

Natural Resources Conservation Council (NRCS), 1930. Soil Survey of Montgomery County. US Department of Agriculture, NRCS.

North Carolina Department of Environment and Natural Resources (NCDENR). 2006. Water Quality Stream Classifications for Streams in North Carolina. Water Quality Section, November 2006. Raleigh, NC.

North Carolina Geological Survey, 1998. North Carolina Geology. North Carolina Department of Environment and Natural Resources, Raleigh, NC.

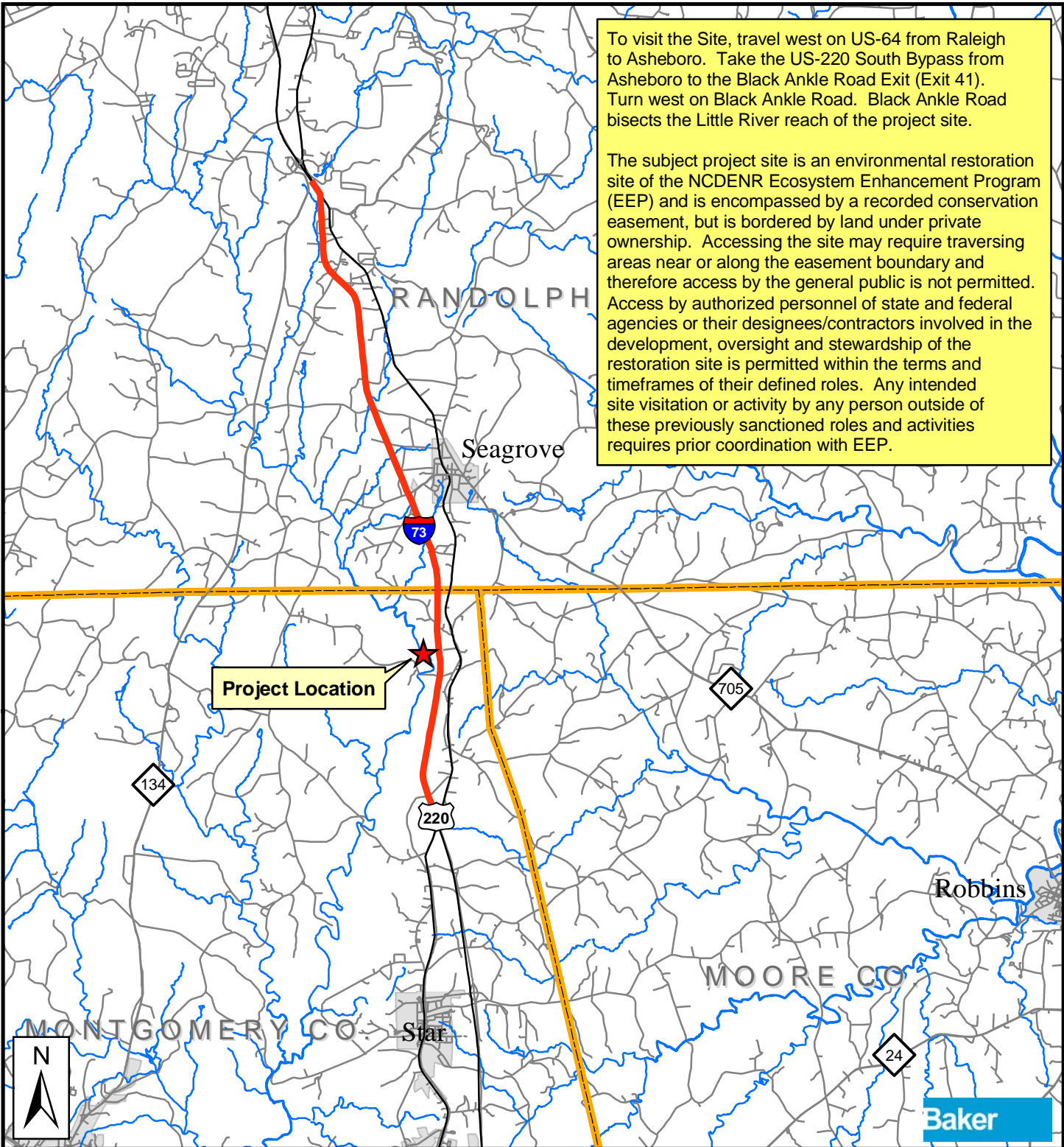
Rosgen, D. L. 1994. A Classification of Natural Rivers. *Catena* 22:169-199.

Rosgen, D.L., 1996. Applied River Morphology. Wildland Hydrology Books, Pagosa Springs, Colo.

**APPENDIX A:  
FIGURES**

To visit the Site, travel west on US-64 from Raleigh to Asheboro. Take the US-220 South Bypass from Asheboro to the Black Ankle Road Exit (Exit 41). Turn west on Black Ankle Road. Black Ankle Road bisects the Little River reach of the project site.

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



**Map Vicinity**

Montgomery County, NC

EEP Project No.: 000623

March 2012

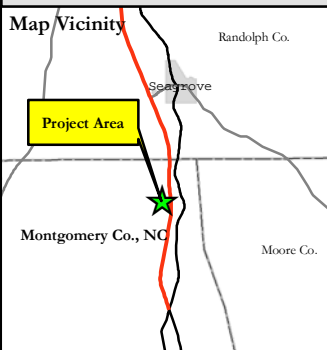
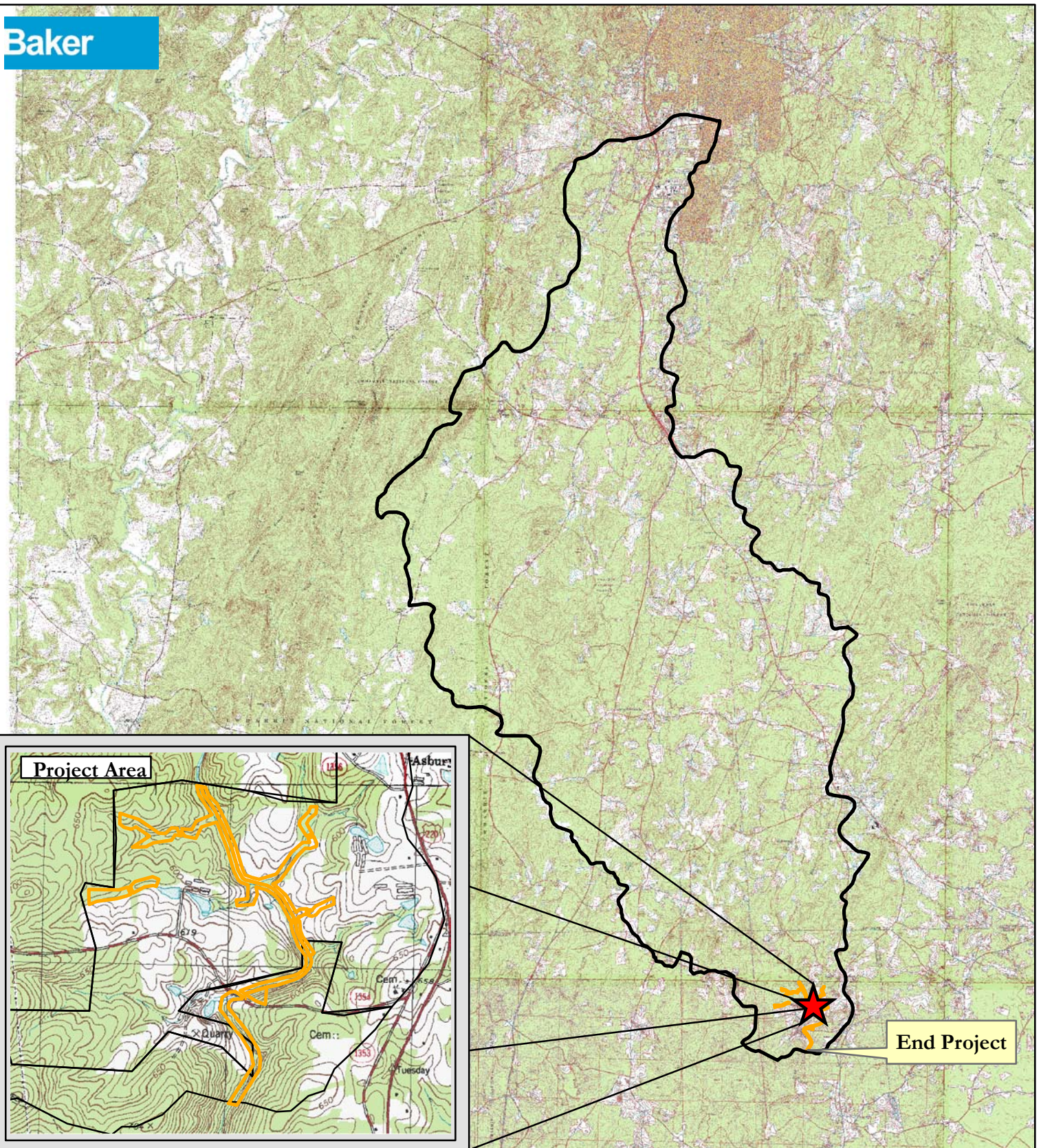
**Figure 1. Project Vicinity Map**  
 Little River Farm Site - Year 2 Monitoring  
 Montgomery County, NC

**LEGEND**

- ★ Location
- ▭ County Boundaries

0 1.25 2.5 Miles

1 inch = 2.5 miles



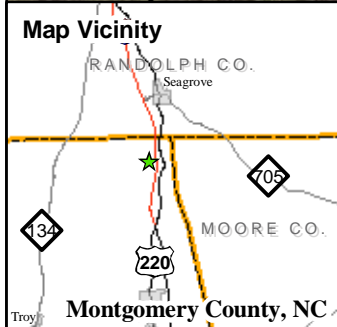
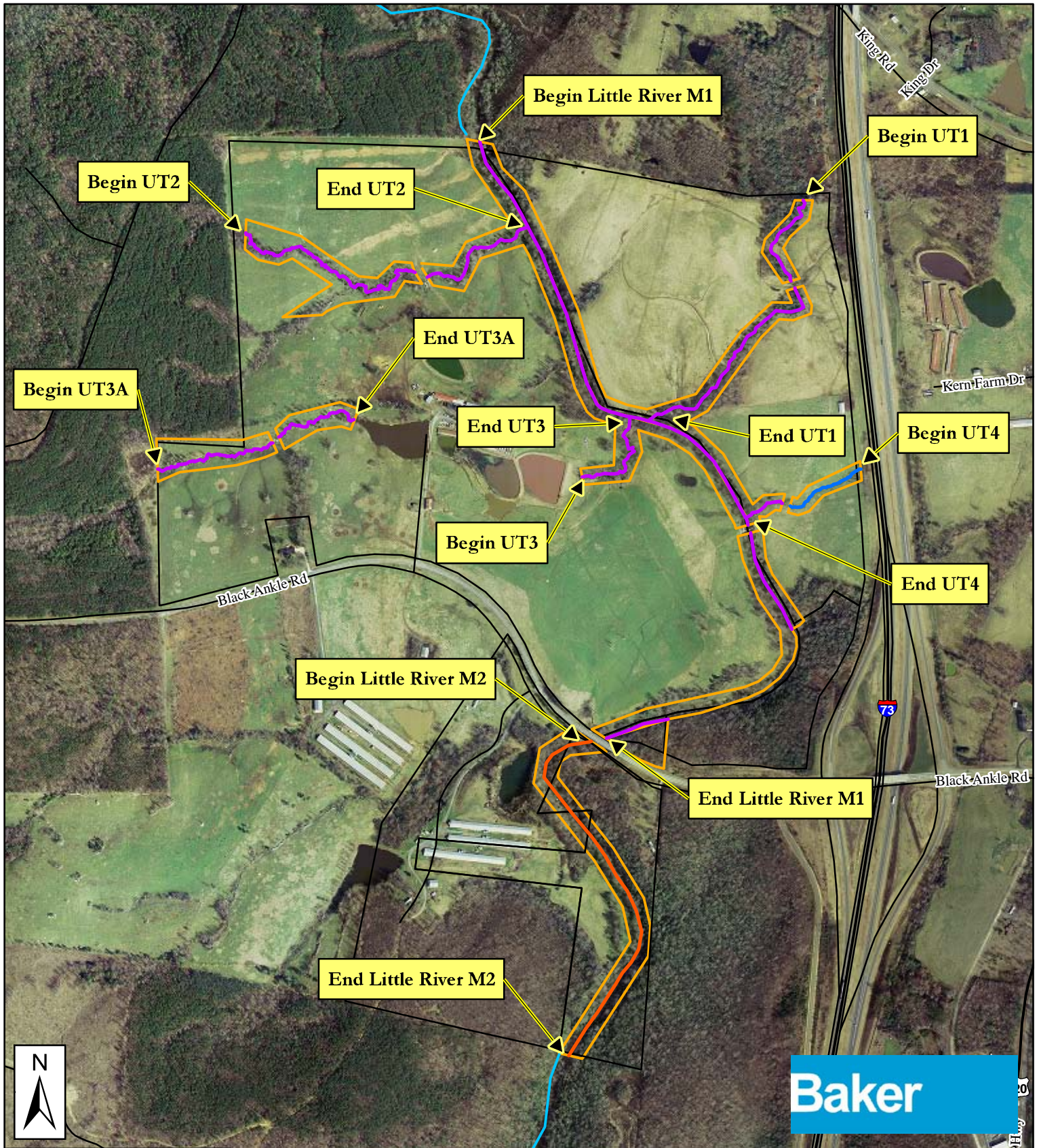
EEP Project No.: 000623

March 2012

**Figure 2. USGS Topographic & Watershed Map**  
Little River Farm Site - Year 2 Monitoring  
*Montgomery County, NC*

- ★ Project Location
- Site Associated Watershed
- Conservation Easement

0 0.5 1 2 Miles



  
 EEP Project No.: 000623  
 March 2012

**Figure 3. Project Summary Map**  
 Little River Farm Site - Year 2 Monitoring  
 Montgomery County, NC

<b>LEGEND</b>	<ul style="list-style-type: none"> <li><span style="color: magenta;">—</span> Stream Enhancement II</li> <li><span style="color: orange;">—</span> Stream Preservation</li> <li><span style="color: blue;">—</span> Stream Restoration</li> <li><span style="color: cyan;">—</span> Streams</li> <li><span style="border: 1px solid orange; display: inline-block; width: 20px; height: 10px;"></span> Conservation Easement</li> <li><span style="border: 1px solid black; display: inline-block; width: 20px; height: 10px;"></span> Project Parcels</li> <li><span style="border-bottom: 1px solid black; width: 20px; display: inline-block;"></span> Roads</li> </ul>	<p>0 200 400 800 Feet</p> <p>1 inch = 800 feet</p>
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**APPENDIX B:  
MORPHOLOGICAL DATA**

# **CROSS-SECTIONS**

# Permanent Cross-section X1

## Little River Farm Site: Project No. 000623

(Year 2 Monitoring Data - Collected December 2011)



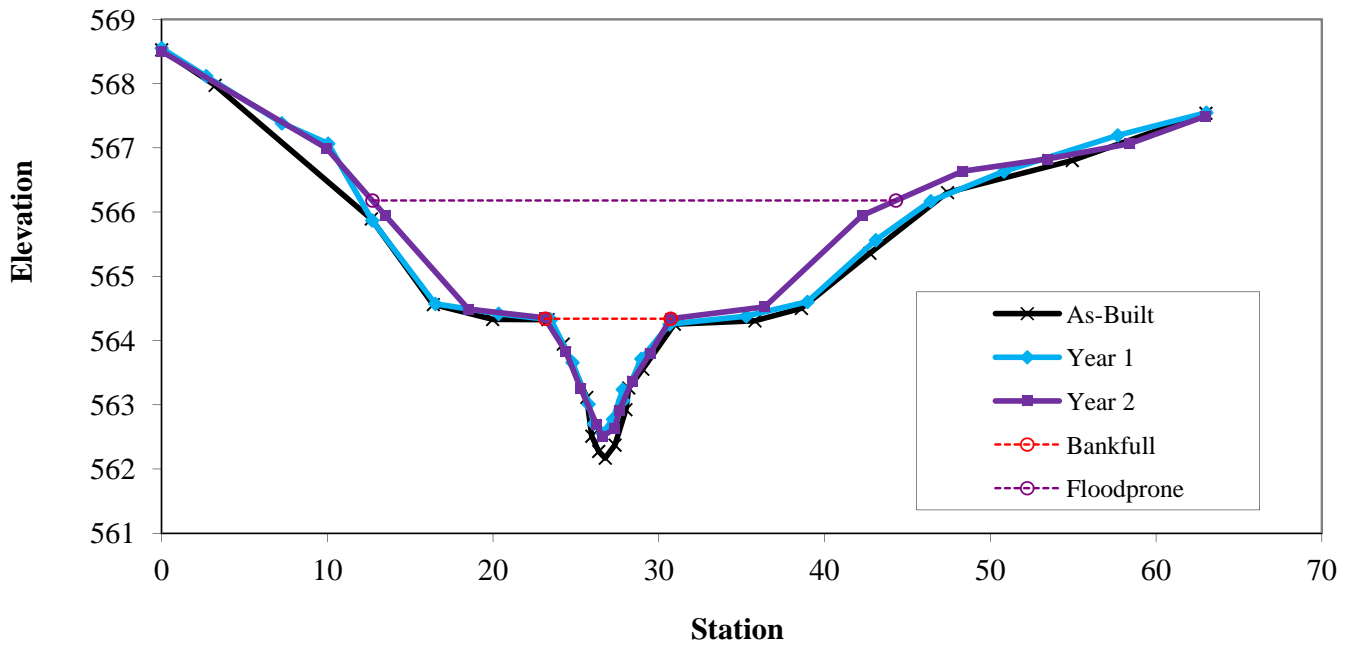
**Looking at Left Bank**



**Looking at Right Bank**

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	E	6.8	7.57	0.9	1.84	8.44	1	4.17	564.34	564.34

### X1 Riffle



# Permanent Cross-section X2

## Little River Farm Site: Project No. 000623

(Year 2 Monitoring Data - Collected December 2011)



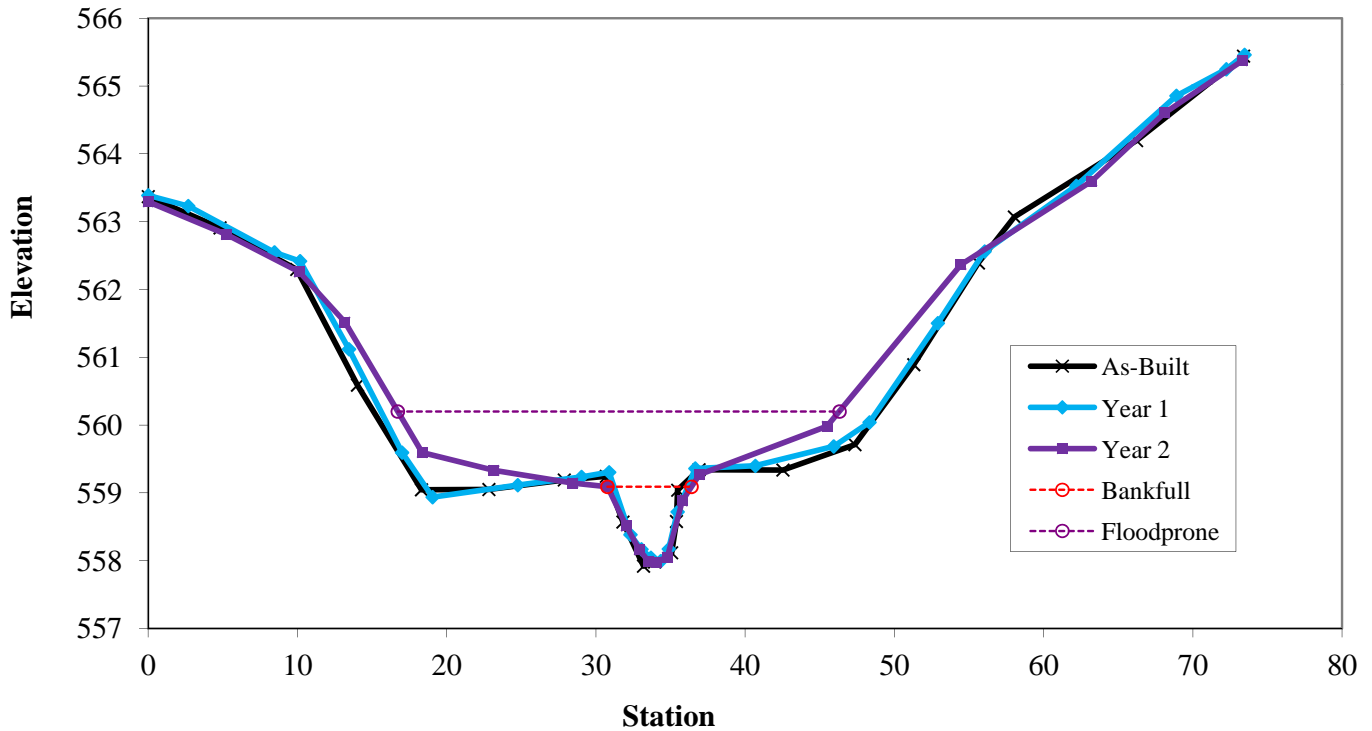
**Looking at Left Bank**



**Looking at Right Bank**

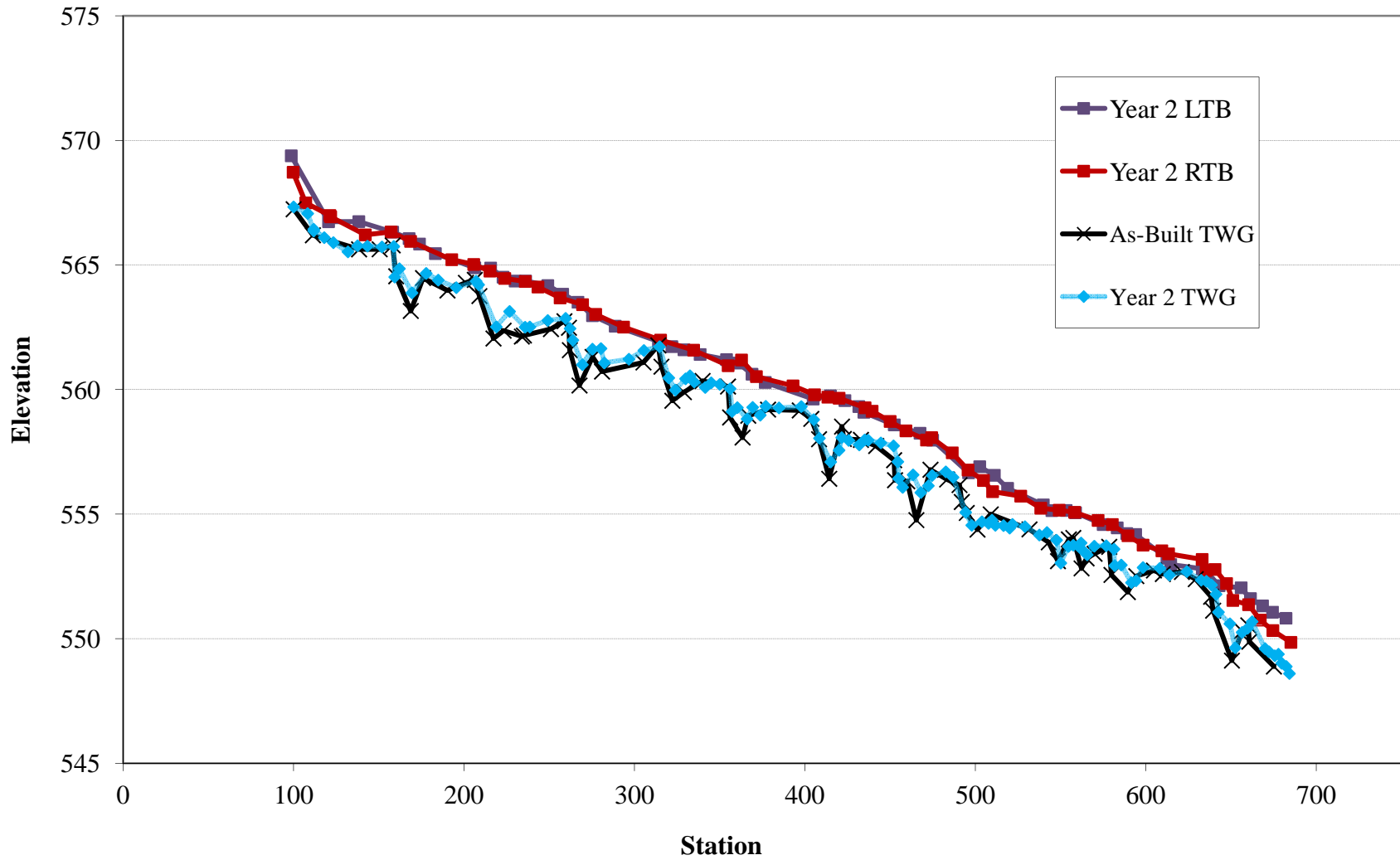
Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	E	3.71	5.63	0.66	1.11	8.54	1	5.25	559.09	559.09

### X2 Riffle



# **LONGITUDINAL PROFILE**

## Little River Farm Site - UT4 Profile Year 2 Monitoring



# **SUMMARY TABLES**

**Table B.1. Baseline Stream Summary**  
**Little River Farm Site: Project No. 000623**

UT4 (515 LF)

Parameter	USGS Gauge	Regional Curve Interval			Pre-Existing Condition						Reference Reach(es) Data					
		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Silas Creek					
											Min	Mean	Med	Max	SD	n
<b>Dimension and Substrate - Riffle</b>																
BF Width (ft)	-----	1.8	6.8	3.6	5.4	5.6	-----	5.7	-----	2	23	25.6	25.7	28.3	-----	5
Floodprone Width (ft)	-----	-----	-----	-----	8.7	12.0	-----	15.3	-----	2	33	36.3	35	41	-----	5
BF Mean Depth (ft)	-----	0.3	0.9	0.6	0.5	0.7	-----	0.9	-----	2	1.5	1.7	1.7	1.9	-----	5
BF Max Depth (ft)	-----	-----	-----	-----	1.5	1.8	-----	2.0	-----	2	2.4	2.8	2.9	3	-----	5
BF Cross-sectional Area (ft²)	-----	0.9	3.8	2.0	2.98	4.0	-----	5.07	-----	2	38.5	43.7	43.1	48.9	-----	5
Width/Depth Ratio	-----	-----	-----	-----	5.76	8.4	-----	10.94	-----	2	121	15.1	-----	17.7	-----	5
Entrenchment Ratio	-----	-----	-----	-----	1.52	2.2	-----	2.83	-----	2	1.2	1.4	-----	1.8	-----	5
Bank Height Ratio	-----	-----	-----	-----	1.75	1.9	-----	2.1	-----	2	1.9	2.1	-----	2.3	-----	5
d50 (mm)	-----	-----	-----	-----	-----	-	-----	-----	-----	-----	-----	19.1	-----	-----	-----	1
<b>Pattern</b>																
Channel Beltwidth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	43.7	-----	-----	-----	1
Radius of Curvature (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	19.5	41.3	-----	54	-----	4
Rc:Bankfull width (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.8	1.6	-----	2.1	-----	4
Meander Wavelength (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	168.3	-----	-----	-----	1
Meander Width Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	6.6	-----	-----	-----	1
<b>Profile</b>																
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	-----	-----	-----	-----	0.09	0.25	0.14	0.75	-----	5	0.003	0.016	0.018	0.026	-----	3
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	62.4	-----	-----	-----	1
Pool Max Depth (ft)	-----	-----	-----	-----	-----	-	-----	-----	-----	-----	4	4.5	4.5	5	-----	3
Pool Volume (ft³)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
<b>Substrate and Transport Parameters</b>																
R1% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.283 / 0.83 / 19.1 / 157 / 300					
Reach Shear Stress (competency) lb/ft²	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Max part size (mm) mobilized at bankfull (Rosgen Curve)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m²	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
<b>Additional Reach Parameters</b>																
Drainage Area (SM)	-----	-----	-----	-----	-----	-----	0.03	-----	-----	-----	-----	-----	-----	3.3	-----	-----
Impervious cover estimate (%)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	-----	-----	-----	-----	G	-----	-----	-----	-----	-----	B4/1c	-----	-----	-----	-----
BF Velocity (fps)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	4.6	-----	-----	-----	-----
BF Discharge (cfs)	-----	2.4	20.9	7.1	-----	-----	-----	-----	-----	-----	-----	199.0	-----	-----	-----	-----
Valley Length	-----	-----	-----	-----	-----	740.0	-----	-----	-----	-----	-----	325	-----	-----	-----	-----
Channel length (ft)	-----	-----	-----	-----	-----	821.0	-----	-----	-----	-----	-----	349	-----	-----	-----	-----
Sinuosity	-----	-----	-----	-----	-----	1.11	-----	-----	-----	-----	-----	1.07	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)²	-----	-----	-----	-----	-----	0.0400	-----	-----	-----	-----	-----	0.0082	-----	-----	-----	-----
BF slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Bankfull Floodplain Area (acres)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

\* Values calculated using bed slope due to lack of water in channel



**Table B.1. Baseline Stream Summary**  
**Little River Farm Site: Project No. 000623**

UT4 (515 LF)

Parameter	Design						As-built						Year 1						Year 2					
	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
<b>Dimension and Substrate - Riffle</b>																								
BF Width (ft)	-----	6.5	-----	-----	-----	1	5.7	6.5	-----	7.2	-----	2	5.7	6.3	-----	7.0	-----	2	5.6	6.6	-----	7.6	-----	2
Floodprone Width (ft)	-----	-----	-----	-----	-----	1	35.9	36.0	-----	36.1	-----	2	32.7	34.1	-----	35.5	-----	2	29.6	30.6	-----	31.6	-----	2
BF Mean Depth (ft)	-----	0.80	-----	-----	-----	1	0.8	0.9	-----	0.9	-----	2	0.8	0.8	-----	0.8	-----	2	0.7	0.8	-----	0.9	-----	2
BF Max Depth (ft)	-----	0.6	-----	-----	-----	1	1.3	1.7	-----	2.0	-----	2	1.3	1.5	-----	1.7	-----	2	1.1	1.5	-----	1.8	-----	2
BF Cross-sectional Area (ft <sup>2</sup> )	-----	3.8	-----	-----	-----	1	4.5	5.6	-----	6.6	-----	2	4.5	5.1	-----	5.7	-----	2	3.7	5.3	-----	6.8	-----	2
Width/Depth Ratio	-----	11.2	-----	-----	-----	1	7.3	7.6	-----	7.8	-----	2	7.1	7.9	-----	8.6	-----	2	8.4	8.5	-----	8.5	-----	2
Entrenchment Ratio	-----	2.0	-----	-----	-----	1	5.0	5.7	-----	6.3	-----	2	4.7	5.5	-----	6.3	-----	2	4.2	4.8	-----	5.3	-----	2
Bank Height Ratio	-----	1.0	-----	-----	-----	1	1.0	1.0	-----	1.0	-----	2	1.0	1.0	-----	1.0	-----	2	1.0	1.0	-----	1.0	-----	2
d50 (mm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
<b>Pattern</b>																								
Channel Beltwidth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Re:Bankfull width (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Width Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
<b>Profile</b>																								
Riffle Length (ft)	10	26	20	70	-----	10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	0.01	0.0201	0.0167	0.05	-----	10	0.02*	0.04*	0.04*	0.06*	-----	5	0.01*	0.05*	0.04*	0.11*	-----	7	0.01*	0.02*	0.02*	0.05*	-----	9
Pool Length (ft)	20	20	20	20	-----	10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	40.0	54.4	50.0	100.0	-----	8	35.9*	48.2*	48.5*	61.0*	-----	10	38.4*	46.6*	47.8*	51.4*	-----	8	40.5*	47.0*	49.0*	54.5*	-----	9
Pool Max Depth (ft)	-----	2.0	-----	-----	-----	1	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Volume (ft <sup>3</sup> )	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
<b>Substrate and Transport Parameters</b>																								
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Reach Shear Stress (competency) lb/ft <sup>2</sup>	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Max part size (mm) mobilized at bankfull (Rosen Curve)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m <sup>2</sup>	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
<b>Additional Reach Parameters</b>																								
Drainage Area (SM)	-----	-----	0.3	-----	-----	-----	-----	-----	-----	0.03	-----	-----	-----	-----	-----	0.03	-----	-----	-----	-----	-----	-----	-----	-----
Impervious cover estimate (%)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosen Classification	-----	B4	-----	-----	-----	-----	-----	E	-----	-----	-----	-----	-----	E	-----	-----	-----	-----	-----	E	-----	-----	-----	-----
BF Velocity (fps)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Discharge (cfs)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valley Length	-----	500.0	-----	-----	-----	-----	-----	532.4	-----	-----	-----	-----	-----	530.9	-----	-----	-----	-----	-----	530.9	-----	-----	-----	-----
Channel length (ft)	-----	550.0	-----	-----	-----	-----	-----	575.0	-----	-----	-----	-----	-----	578.2	-----	-----	-----	-----	-----	584.2	-----	-----	-----	-----
Sinuosity	-----	1.10	-----	-----	-----	-----	-----	1.08	-----	-----	-----	-----	-----	1.09	-----	-----	-----	-----	-----	1.10	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)*	-----	0.0310	-----	-----	-----	-----	-----	0.03*	-----	-----	-----	-----	-----	0.03*	-----	-----	-----	-----	-----	0.03*	-----	-----	-----	-----
BF slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Bankfull Floodplain Area (acres)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

\* Values calculated using bed slope due to lack of water in channel

Table B.2. Morphology and Hydraulic Monitoring Summary																									
Little River Farm Site: Project No. 000623																									
UT4 (S15 LF)																									
Dimension and substrate		Cross-section 1 (Riffle)					Cross-section 2 (Riffle)																		
		Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
<b>Based on fixed baseline bankfull elevation</b>																									
	BF Width (ft)	7.2	7.0	7.6			5.7	5.7	5.6																
	BF Mean Depth (ft)	0.9	0.8	0.9			0.8	0.8	0.7																
	Width/Depth Ratio	7.8	8.6	8.4			7.3	7.1	8.5																
	BF Cross-sectional Area (ft <sup>2</sup> )	6.6	5.7	6.8			4.5	4.5	3.7																
	BF Max Depth (ft)	2.0	1.7	1.8			1.3	1.3	1.1																
	Width of Floodprone Area (ft)	35.9	32.7	31.6			36.1	35.5	29.6																
	Entrenchment Ratio	5.0	4.7	4.2			6.3	6.3	5.3																
	Bank Height Ratio	1.0	1.0	1.0			1.0	1.0	1.0																
	Wetted Perimeter (ft)	9.0	8.6	9.4			7.3	7.3	7.0																
	Hydraulic Radius (ft)	0.7	0.7	0.7			0.6	0.6	0.5																
<b>Based on current/developing bankfull feature</b>																									
	BF Width (ft)	-	-	-			-	-	-																
	BF Mean Depth (ft)	-	-	-			-	-	-																
	Width/Depth Ratio	-	-	-			-	-	-																
	BF Cross-sectional Area (ft <sup>2</sup> )	-	-	-			-	-	-																
	BF Max Depth (ft)	-	-	-			-	-	-																
	Width of Floodprone Area (ft)	-	-	-			-	-	-																
	Entrenchment Ratio	-	-	-			-	-	-																
	Bank Height Ratio	-	-	-			-	-	-																
	Wetted Perimeter (ft)	-	-	-			-	-	-																
	Hydraulic Radius (ft)	-	-	-			-	-	-																
	Cross Sectional Area between end pins (ft <sup>2</sup> )	-	-	-			-	-	-																
	d50 (mm)	-	-	-			-	-	-																
<b>Dimension and substrate</b>																									
<b>Based on fixed baseline bankfull elevation</b>																									
	BF Width (ft)																								
	BF Mean Depth (ft)																								
	Width/Depth Ratio																								
	BF Cross-sectional Area (ft <sup>2</sup> )																								
	BF Max Depth (ft)																								
	Width of Floodprone Area (ft)																								
	Entrenchment Ratio																								
	Bank Height Ratio																								
	Wetted Perimeter (ft)																								
	Hydraulic Radius (ft)																								
<b>Based on current/developing bankfull feature</b>																									
	BF Width (ft)																								
	BF Mean Depth (ft)																								
	Width/Depth Ratio																								
	BF Cross-sectional Area (ft <sup>2</sup> )																								
	BF Max Depth (ft)																								
	Width of Floodprone Area (ft)																								
	Entrenchment Ratio																								
	Bank Height Ratio																								
	Wetted Perimeter (ft)																								
	Hydraulic Radius (ft)																								
	Cross Sectional Area between end pins (ft <sup>2</sup> )																								
	d50 (mm)																								

<b>Table B.3. Stream Problem Areas</b>			
<b>Little River Farm Site: Project No. 000623</b>			
<b>UT4</b>			
<b>Feature Issue</b>	<b>Station No.</b>	<b>Suspected Cause</b>	<b>Photo Number</b>
Aggradation / Bar Formation	-	-	-
Bank Scour / Raw Bank	See Table C.6 in Appendix C		
Bed Scour/Degradation	-	-	-
Engineered Structures - back or arm scour	-	-	-
Engineered Structures - improper elevations	-	-	-

**Table B4. Visual Morphological Stability Assessment**  
**Little River Farm Site: Project No. 000623**

UT4 (515 LF)						
Feature Category	Metric (per As-Built and reference baselines)	(# Stable) Number Performing as Intended	Total number per As-Built	Total Number / feet in unstable state	% Performing in Stable Condition	Feature Performance Mean or Total
A. Riffles	1. Present?	10	10	0	100	
	2. Armor stable (e.g. no displacement)?	10	10	0	100	
	3. Facet grades appears stable?	10	10	0	100	
	4. Minimal evidence of embedding/fining?	10	10	0	100	
	5. Length appropriate?	10	10	0	100	<b>100%</b>
B. Pools	1. Present? (e.g. not subject to severe aggradation or migration?)	10	10	0	100	
	2. Sufficiently deep (Max Pool D:Mean Bkf >1.6?)	10	10	0	100	
	3. Length appropriate?	10	10	0	100	<b>100%</b>
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	N/A	N/A	0	100	
	2. Downstream of meander (glide/inflection) centering?	N/A	N/A	0	100	<b>100%</b>
D. Meanders	1. Outer bend in state of limited/controlled erosion?	N/A	N/A	0	100	
	2. Of those eroding, # w/concomitant point bar formation?	N/A	N/A	0	100	
	3. Apparent Rc within spec?	N/A	N/A	0	100	
	4. Sufficient floodplain access and relief?	N/A	N/A	0	100	<b>100%</b>
E. Bed General	1. General channel bed aggradation areas (bar formation)	N/A	N/A	0	100	
	2. Channel bed degradation - areas of increasing down-cutting or head cutting?	N/A	N/A	0	100	<b>100%</b>
F. Bank	1. Actively eroding, wasting, or slumping bank	N/A	N/A	10/169	84	<b>84%</b>
G. Vanes	1. Free of back or arm scour?	9	9	0	100	
	2. Height appropriate?	9	9	0	100	
	3. Angle and geometry appear appropriate?	9	9	0	100	
	4. Free of piping or other structural failures?	9	9	0	100	<b>100%</b>
H. Wads/Boulders	1. Free of scour?	9	9	0	0%	100%
	2. Footing stable?	9	9	0	0%	<b>100%</b>

**APPENDIX C:  
VEGETATION DATA**

# **VEGETATION RAW DATA**

**Plot 92759-01-0001**

Please fill in any missing data and fix incorrect data.

**Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5):  Date:  -  /  Party:  Role:

Taxonomic Standard:  Notes on plot:

Taxonomic Standard DATE:

Latitude or UTM-N:  Datum:  (dec.deg. or m)

Longitude or UTM-E:  UTM Zone:

Coordinate Accuracy (m):  X-Axis bearing (deg):

Plot Dimensions: X:  Y:   Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X)

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Nov 2010 Data			THIS YEAR'S DATA						
						ddh 1 mm	Height 1cm*	DBH 1 cm	ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1500	Liriodendron tulipifera ✓	Ⓔ	R			9	61.0	0.0	10	87		<input type="checkbox"/>	3		
1-1															
1501	Liriodendron tulipifera ✓	Ⓔ	R			8	50.0	0.0	11	60		<input type="checkbox"/>	3		
1-2															
1502	Liriodendron tulipifera ✓	Ⓔ	R			6	49.0	0.0	7	44		<input type="checkbox"/>	2		
1-3															
1504	Corylus cornuta ✓	Ⓔ	R			7	84.0	0.0	7	77		<input type="checkbox"/>	3		
1-5															
1505	Fraxinus pennsylvanica ✓	Ⓔ	R			6	47.0	0.0	9	46		<input type="checkbox"/>	2		
1-6															
1506	Nyssa sylvatica ✓	Ⓔ	R			5	29.0	0.0	10	31		<input type="checkbox"/>	2		
1-7															
1507	Nyssa sylvatica ✓	Ⓔ	R			5	47.0	0.0	8	55		<input type="checkbox"/>	3		
1-8															
1508	Liriodendron tulipifera ✓	Ⓔ	R			5	25.0	0.0	4	27		<input type="checkbox"/>	2		
1-9															
1509	Betula nigra ✓	Ⓔ	R			4	31.0	0.0	13	104		<input checked="" type="checkbox"/>	4		
1-10	Broken stem														
1510	Quercus falcata ✓	Ⓔ	R			10	86.0	0.0	13	100		<input type="checkbox"/>	3		
1-11															
1511	Carya ovata ✓	Ⓔ	R			2	17.0	0.0	4	38		<input type="checkbox"/>	2		
1-12	Broken stem														
1512	Celtis laevigata	Ⓔ	R			2	21.0	0.0				<input type="checkbox"/>	M		DNF
1-13	Broken stem														

# stems: 12 New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	ddh 1 mm	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes

2 questionable trees - Pink/Black flagging - previously flagged

\*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown p. 1  
 \*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing  
 \*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSEcts, GAME, LIVESTock, Other/Unknown ANIMAL, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicanE, DISeased, VINE Strangulation, UNKNown, specify other.  
 \*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m. Printed in the CVS-EEP Entry Tool ver. 2.2.7

**Plot 92759-01-0002**

Please fill in any missing data and fix incorrect data.

**Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5):  Date:  -  /  /

Taxonomic Standard:  Party:  Role:

Taxonomic Standard DATE:

Latitude or UTM-N:  Datum:  Notes on plot:

(dec.deg. or m)

Longitude or UTM-E:  UTM Zone:

Coordinate Accuracy (m):  X-Axis bearing (deg):

Plot Dimensions: X:  Y:   Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X)

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Nov 2010 Data			THIS YEAR'S DATA						
						ddh 1 mm	Height 1cm*	DBH 1 cm	ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1513	Cornus amomum ✓	(E)	R			9	83.0	0.0	11	113		<input type="checkbox"/>	3		
2-1															
1514	Cornus amomum ✓	(E)	R			6	39.0	0.0	7	50		<input type="checkbox"/>	2		
2-2															
1515	Cornus amomum ✓	(E)	R			10	107.0	0.0	12	155.5	4	<input type="checkbox"/>	4		
2-3	Broken stem but has new growth														
1516	Cornus amomum ✓	(E)	R			6	69.0	0.0	9	98.0		<input type="checkbox"/>	3		
2-4															
1517	Corylus cornuta ✓	(E)	R			7	70.0	0.0	8.0	74		<input type="checkbox"/>	3		
2-5															
1519	Platanus occidentalis ✓	(E)	R			12	82.0	0.0	25	232	13	<input type="checkbox"/>	4		
2-7															
1520	Quercus falcata ✓	(E)	R			23	125.0	0.0	36	222	12	<input type="checkbox"/>	4		
2-8															
1521	Cornus amomum ✓	(E)	R			15	132.0	3.0	25	169	7	<input type="checkbox"/>	4		
2-9															
1522	Cornus amomum ✓	(E)	R			18	169.0	5.0	25.0	206	8	<input type="checkbox"/>	4		main stem splitting
2-10															
1523	Cornus amomum ✓	(E)	R			15	124.0	0.0	11	178.5	5	<input type="checkbox"/>	4		
2-11															
1524	Cornus amomum ✓	(E)	R			7	95.0	0.0	16.0	160	4	<input type="checkbox"/>	4		
2-12															
1525	Cornus amomum ✓	(E)	R			15	111.0	0.0	12.0	135	4	<input type="checkbox"/>	4		
2-13															
1526	Cornus amomum ✓	(E)	R			13	121.0	0.0	13.0	168	5	<input type="checkbox"/>	4		
2-14	Broken limb														
1527	Cornus amomum ✓	(E)	R			16	117.0	0.0	27.0	212	6	<input type="checkbox"/>	4		
2-15															
1528	Cornus amomum ✓	(E)	R			13	116.0	0.0	12.0	147.5	3	<input type="checkbox"/>	4		
2-16															

# stems: 15 New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	ddh 1 mm	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes

\*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown p. 3  
 \*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing  
 \*DAMAGE: REMOval, CUT, MOWing, BEAVer, DEER, RODents, INSEcts, GAME, LIVESTock, Other/Unknown ANIMAL, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRICane, DISeased, VINE Strangulation, UNKNOwn, specify other.  
 \*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.  
 Printed in the CVS-EPP Entry Tool ver. 2.2.7



**Plot 92759-01-0003**

Please fill in any missing data and fix incorrect data.

**Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5):  Date:  -  /

Taxonomic Standard:

Taxonomic Standard DATE:

Latitude or UTM-N:  (dec.deg. or m) Datum:

Longitude or UTM-E:  UTM Zone:

Coordinate Accuracy (m):  X-Axis bearing (deg):

Party:  Role:

Notes on plot:

Plot Dimensions: X:  Y:   Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X)

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Nov 2010 Data			THIS YEAR'S DATA						
						ddh 1 mm	Height 1cm*	DBH 1 cm	ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1529	Betula nigra ✓	(E)	R			8	54.0	0.0	23	200	6	<input type="checkbox"/>	4		
3-1															
1530	Liriodendron tulipifera	(E)	R			10	61.0	0.0				<input type="checkbox"/>	0		
3-2															
1531	Betula nigra ✓	(E)	R			13	75.0	0.0	22	6		<input type="checkbox"/>	1		INTENT-CUT
3-3															
1533	Betula nigra ✓	(E)	R			9	63.0	0.0	20	194	6	<input type="checkbox"/>	4		
3-5															
1534	Quercus michauxii ✓	(E)	R			3	21.0	0.0	5	55		<input type="checkbox"/>	3		
3-6															
1535	Quercus michauxii ✓	(E)	R			7	20.0	0.0	10	20		<input type="checkbox"/>	1		CUT DAM. FOR LAST YR
3-7	Broken stem/new growth														
1536	Platanus occidentalis ✓	(E)	R			5	48.0	0.0	19	48		<input type="checkbox"/>	2		APPARENT INTENTIONAL CUT
3-8															
1537	Quercus michauxii ✓	(E)	R			8	45.0	0.0	14	69		<input type="checkbox"/>	3		
3-9															
1538	Corylus cornuta ✓	(E)	R			5	40.0	0.0	7	2		<input type="checkbox"/>	1		
3-10															
1539	Corylus cornuta ✓	(E)	R			4	56.0	0.0	6	61		<input type="checkbox"/>	2		
3-11	Broken stem/new growth														
1540	Corylus cornuta ✓	(E)	R			5	32.0	0.0	9	51		<input type="checkbox"/>	1		
3-12	Broken stem/new growth														
1541	Corylus cornuta	(E)	R			8	23.0	0.0				<input type="checkbox"/>	0		
3-13															

# stems: 12 New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	ddh 1 mm	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes

\*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown p. 5  
 \*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing. \*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown  
 ANIMAL, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUGHT, STORM, HURRICane, DISeased, VINE Strangulation, UNKNown, specify other.  
 \*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m. Printed in the CVS-EPP Entry Tool ver. 2.2.7

**Plot 92759-01-0004**

Please fill in any missing data and fix incorrect data.

**Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5):  Date:  -  Party:  Role:

Taxonomic Standard:

Taxonomic Standard DATE:

Latitude or UTM-N:  Datum:  Notes on plot:

(dec.deg. or m)

Longitude or UTM-E:  UTM Zone:

Coordinate Accuracy (m):  X-Axis bearing (deg):

Plot Dimensions: X:  Y:   Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X)

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Nov 2010 Data			THIS YEAR'S DATA						
						ddh 1 mm	Height 1cm*	DBH 1 cm	ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
515	Celtis laevigata ✓	(E)	R			5	40.0	0.0	7	55	-	<input type="checkbox"/>	2		
4-1															
518	Corylus cornuta	(E)	R			6	61.0	0.0	-	-	-	<input type="checkbox"/>	0		
4-4															
520	Quercus laurifolia ✓	(E)	R			7	52.0	0.0	16	87	-	<input type="checkbox"/>	4		
4-6															
523	Quercus falcata	(E)	R			4	50.0	0.0	-	-	-	<input type="checkbox"/>	0		
4-9															
524	Quercus laurifolia ✓	(E)	R			5	37.0	0.0	11	21	-	<input type="checkbox"/>	1	CUT	INT. CUT
4-10															
525	Quercus laurifolia ✓	(E)	R			6	41.0	0.0	23	29	-	<input type="checkbox"/>	1	CUT	INT. CUT CLEAR
4-11															
526	Quercus laurifolia	(E)	R			3	30.0	0.0	-	-	-	<input type="checkbox"/>	0		
4-12															
527	Quercus laurifolia ✓	(E)	R			7	51.0	0.0	16	24	-	<input type="checkbox"/>	1	CUT	INT. CUT
4-13															

# stems: 8 New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	ddh 1 mm	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes
4-14 Quercus michauxii	R			6	1.45'		2	44.2 cm	Replanted (Back Row)
4-15 Quercus bicolor	R			4	1.96'		2	59.7 cm	Replanted (Back Row)
4-16 Betula nigra	R			4	2.4'		2	73.2 cm	Replanted (Back Row)
4-17				12	1.96'				

ALL TREES ALONG FENCE LINE CUT

QUERCUS MICHAUXII

\*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown p. 7

\*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing

\*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSEcts, GAME, LIVESTock, Other/Unknown ANIMAL, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUGHT, STORM, HURRICane, DISeased, VINE Strangulation, UNKNown, specify other.

\*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Printed in the CVS-EEP Entry Tool ver. 2.2.7

**Plot 92759-01-0005**

Please fill in any missing data and fix incorrect data.

**Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5):  Date:  -  Party:  Role:

Taxonomic Standard:

Taxonomic Standard DATE:

Latitude or UTM-N:  (dec.deg. or m) Datum:

Longitude or UTM-E:  UTM Zone:

Coordinate Accuracy (m):  X-Axis bearing (deg):

Plot Dimensions: X:  Y:   Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X)

Notes on plot:

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Nov 2010 Data			THIS YEAR'S DATA						
						ddh 1 mm	Height 1cm*	DBH 1 cm	ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1542	Asimina triloba ✓	Ⓔ	R			4	33.0	0.0	6	47		<input type="checkbox"/>	1		
5-1															
1545	Asimina triloba ✓	Ⓔ	R			2	25.0	0.0	5	43		<input type="checkbox"/>	1		
5-4															
1546	Cornus florida ✓	Ⓔ	R			5	65.0	0.0	10	102		<input type="checkbox"/>	3		
5-5															
1547	Cornus florida ✓	Ⓔ	R			7	66.0	0.0	11	68		<input type="checkbox"/>	4		
5-6															
1548	Cornus florida ✓	Ⓔ	R			8	78.0	0.0	14	107		<input type="checkbox"/>	4		
5-7															
1549	Corylus cornuta ✓	Ⓔ	R			5	60.0	0.0	7	57		<input type="checkbox"/>	3		
5-8															
1550	Quercus michauxii ✓	Ⓔ	R			10	93.0	0.0	20	207	8	<input type="checkbox"/>	4		
5-9															
1551	Quercus michauxii ✓	Ⓔ	R			8	76.0	0.0	17	174	10	<input type="checkbox"/>	4		
5-10															
1552	Quercus michauxii ✓	Ⓔ	R			23	100.0	0.0	26	195	10	<input type="checkbox"/>	4		
5-11															
1553	Liriodendron tulipifera ✓	Ⓔ	R			9	59.0	0.0	16	100		<input type="checkbox"/>	4		
5-12															
1554	Celtis laevigata	Ⓔ	R			6	75.0	0.0	16	134	4	<input type="checkbox"/>	4		
5-13															

# stems: 11 New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	ddh 1 mm	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes

\*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown p. 9  
 \*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing. \*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSEcts, GAME, LIVESTock, Other/Unknown  
 ANIMAl, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRICane, DISeased, VINE Strangulation, UNKNown, specify other.  
 \*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m. Printed in the CVS-EEP Entry Tool ver. 2.2.7

**Plot 92759-01-0006**

Please fill in any missing data and fix incorrect data.

**Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5):  Date:  -  Party:  Role:  Notes on plot:

Taxonomic Standard:

Taxonomic Standard DATE:

Latitude or UTM-N:  Datum:

(dec.deg. or m)

Longitude or UTM-E:  UTM Zone:

Coordinate Accuracy (m):  X-Axis bearing (deg):

Plot Dimensions: X:  Y:   Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X)

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Nov 2010 Data			THIS YEAR'S DATA						
						ddh 1 mm	Height 1cm*	DBH 1 cm	ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1555	Quercus michauxii	(E)	R			3	15.0	0.0	-	-	-	<input type="checkbox"/>	0		
	6-1 Broken Stem														
1556	Quercus michauxii	(E)	R			2	16.0	0.0	-	-	-	<input type="checkbox"/>	0		
	6-2 Broken Stem														
1559	Corylus cornuta	(E)	R			5	25.0	0.0	-	-	-	<input type="checkbox"/>	0		
	6-5														
1560	Fraxinus pennsylvanica ✓	(E)	R			8	49.0	0.0	8	73	-	<input type="checkbox"/>	2		
	6-6														
1561	Fraxinus pennsylvanica ✓	(E)	R			10	77.0	0.0	10	161	8	<input type="checkbox"/>	4		
	6-7														
1562	Betula nigra ✓	(E)	R			6	55.0	0.0	6	30	-	<input type="checkbox"/>	1		BROKEN FRANCHISES
	6-8														
1563	Fraxinus pennsylvanica ✓	(E)	R			6	46.0	0.0	13	74	-	<input type="checkbox"/>	3		
	6-9														
1564	Platanus occidentalis ✓	(E)	R			7	68.0	0.0	8	67	-	<input type="checkbox"/>	2		
	6-10														
1565	Betula nigra ✓	(E)	R			8	75.0	0.0	21	114	-	<input type="checkbox"/>	4		
	6-11														
1566	Platanus occidentalis ✓	(E)	R			5	43.0	0.0	6	44	-	<input type="checkbox"/>	1		
	6-12														
1567	Platanus occidentalis ✓	(E)	R			14	99.0	0.0	27	157	7	<input type="checkbox"/>	4		
	6-13														
1568	Carpinus caroliniana ✓	(E)	R			5	37.0	0.0	8	65	-	<input type="checkbox"/>	2		
	6-14														
1569	Fraxinus pennsylvanica ✓	(E)	R			7	68.0	0.0	14	121	5	<input type="checkbox"/>	4		
	6-15														
1570	Carpinus caroliniana ✓	(E)	R			4	60.0	0.0	8	85	-	<input type="checkbox"/>	3		
	6-16														
1571	Platanus occidentalis ✓	(E)	R			7	71.0	0.0	10	66	-	<input type="checkbox"/>	2		
	6-17														
1572	Carpinus caroliniana ✓	(E)	R			3	66.0	0.0	10	100	-	<input type="checkbox"/>	3		
	6-18														
1573	Fraxinus pennsylvanica ✓	(E)	R			8	76.0	0.0	14	121	4	<input type="checkbox"/>	3		
	6-19														

6-20 Quercus michauxii R 7 1.25' 2: 38.1 cm

6-21 Fraxinus pennsylvanica R 12 2.83' 2 86.3 cm

\*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown p. 11

\*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing. \*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSEcts, GAME, LIVESTock, Other/Unknown ANIMAl, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUGHT, STORM, HURRricane, DISeased, VINE Strangulation, UNKNown, specify other.

\*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m. Printed in the CVS-EEP Entry Tool ver. 2.2.7

**Plot 92759-01-0007**

Please fill in any missing data and fix incorrect data.

**Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5):  Date:  -  /

Taxonomic Standard:

Taxonomic Standard DATE:

Latitude or UTM-N:  (dec.deg. or m) Datum: NAD83/W

Longitude or UTM-E:  UTM Zone:

Coordinate Accuracy (m):  X-Axis bearing (deg):

Party:  Role:

Notes on plot:

Plot Dimensions: X:  Y:   Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X)

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Nov 2010 Data			THIS YEAR'S DATA						
						ddh 1 mm	Height 1cm*	DBH 1 cm	ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1574	Quercus laurifolia ✓	Ⓔ	R			6	38.0	0.0	15	74	-	<input type="checkbox"/>	3		
7-1															
1577	Quercus michauxii ✓	Ⓔ	R			9	45.0	0.0	10	44	-	<input type="checkbox"/>	1		BKN BRANCHES
7-4															
1578	Quercus michauxii	Ⓔ	R			6	27.0	0.0	-	-	-	<input type="checkbox"/>	0		
7-5															
1579	Quercus laurifolia ✓	Ⓔ	R			8	45.0	0.0	14	115	-	<input type="checkbox"/>	4		
7-6															
1580	Quercus michauxii ✓	Ⓔ	R			8	43.0	0.0	12	87	-	<input type="checkbox"/>	2		
7-7															
1581	Quercus laurifolia	Ⓔ	R			6	44.0	0.0	-	-	-	<input type="checkbox"/>	0		
7-8															
1582	Liriodendron tulipifera	Ⓔ	R			9	48.0	0.0	10	31	-	<input type="checkbox"/>	1		
7-9															
1583	Liriodendron tulipifera	Ⓔ	R			9	87.0	0.0	-	-	-	<input type="checkbox"/>	0		
7-10															
1584	Liriodendron tulipifera	Ⓔ	R			7	55.0	0.0	-	-	-	<input type="checkbox"/>	0		
7-11															
1585	Liriodendron tulipifera	Ⓔ	R			12	92.0	0.0	-	-	-	<input type="checkbox"/>	0		
7-12															
1586	Carya ovata	Ⓔ	R			0	6.0	0.0	-	-	-	<input type="checkbox"/>	0		
7-13	Broken stem at base														
1588	Liriodendron tulipifera	Ⓔ	R			0	0.0	0.0	-	-	-	<input type="checkbox"/>	0		
7-15	Broken stem at base														
1589	Liriodendron tulipifera	Ⓔ	R			8	64.0	0.0	-	-	-	<input type="checkbox"/>	0		
7-16															

# stems: 13 New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	ddh 1 mm	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes

\*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown p. 14  
 \*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing  
 \*DAMAGE: REMOval, CUT, MOWing, BEAVer, DEER, RODents, INSEcts, GAME, LIVESTock, Other/Unknown ANIMAl, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRricane, DiSeased, VINE Strangulation, UNKNOwn, specify other.  
 \*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.  
 Printed in the CVS-EEP Entry Tool ver. 2.2.7

**Plot 92759-01-0008**

Please fill in any missing data and fix incorrect data.

**Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5):  Date:  -  Party:  Role:  Notes on plot:

Taxonomic Standard:

Taxonomic Standard DATE:

Latitude or UTM-N:  Datum: NAD83/W

(dec.deg. or m)

Longitude or UTM-E:  UTM Zone:

Coordinate Accuracy (m):  X-Axis bearing (deg):

Plot Dimensions: X:  Y:   Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X)

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Nov 2010 Data			THIS YEAR'S DATA						
						ddh 1 mm	Height 1 cm*	DBH 1 cm	ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1591	Quercus michauxii ✓	Ⓔ	R			8	72.0	0.0	20	158	8	<input type="checkbox"/>	4		
8-2															
1592	Quercus michauxii ✓	Ⓔ	R			6	58.0	0.0	13	124	4	<input type="checkbox"/>	4		
8-3															
1593	Quercus falcata	Ⓔ	R			5	19.0	0.0				<input type="checkbox"/>	0		
8-4															
1595	Quercus laurifolia ✓	Ⓔ	R			4	39.0	0.0	11	131	3	<input type="checkbox"/>	4		DAMAGE TO TRUNK
8-6															
1596	Quercus laurifolia ✓	Ⓔ	R			9	50.0	0.0	12	49		<input type="checkbox"/>	2		
8-7															
1597	Betula nigra ✓	Ⓔ	R			8	95.0	0.0	23	179	4	<input type="checkbox"/>	4		
8-8															
1598	Asimina triloba ✓	Ⓔ	R			3	26.0	0.0	5	36		<input type="checkbox"/>	1		DAMAGED TRUNK
8-9															
1599	Betula nigra ✓	Ⓔ	R			13	153.0	3.0	24	195	4	<input type="checkbox"/>	4		
8-10															
1601	Platanus occidentalis ✓	Ⓔ	R			13	139.0	4.0	43	270	23	<input type="checkbox"/>	4		
8-12															
1602	Fraxinus pennsylvanica ✓	Ⓔ	R			5	46.0	0.0	15	100		<input type="checkbox"/>	1		
8-13															
1603	Fraxinus pennsylvanica ✓	Ⓔ	R			4	69.0	0.0	10	98		<input type="checkbox"/>	2		
8-14															
1604	Platanus occidentalis ✓	Ⓔ	R			6	61.0	0.0	10	90		<input type="checkbox"/>	2		
8-15															
1605	Fraxinus pennsylvanica ✓	Ⓔ	R			6	71.0	0.0	14	117		<input type="checkbox"/>	2		
8-16															

# stems: 13 New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	ddh 1 mm	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes

~~B.H.L.T~~

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\*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown p. 16  
 \*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing  
 \*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSEcts, GAME, LIVESTock, Other/Unknown ANIMAL, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUGHT, STORM, HURRICane, DISeased, VINE Strangulation, UNKNown, specify other.  
 \*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m. Printed in the CVS-EEP Entry Tool ver. 2.2.7

**Plot 92759-01-0009**

Please fill in any missing data and fix incorrect data.

**Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5):  Date:  -  Party:  Role:  Notes on plot:

Taxonomic Standard:

Taxonomic Standard DATE:

Latitude or UTM-N:  (dec.deg. or m) Datum:  UTM Zone:

Longitude or UTM-E:

Coordinate Accuracy (m):  X-Axis bearing (deg):

Plot Dimensions: X:  Y:   Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X)

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Nov 2010 Data			THIS YEAR'S DATA						
						ddh 1 mm	Height 1cm*	DBH 1 cm	ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1607	Quercus falcata ✓	Ⓔ	R			10	90.0	0.0	12.0	101		<input type="checkbox"/>	3		Bent over
9-2															
1608	Quercus michauxii ✓	Ⓔ	R			14	116.0	0.0	36.0	188	9.0	<input type="checkbox"/>	4		
9-3															
1609	Quercus falcata ✓	Ⓔ	R			13	143.0	6.0	30.0	200	15.0	<input type="checkbox"/>	4		
9-4															
1610	Cornus amomum ✓	Ⓔ	R			12	80.0	0.0	18.0	126	6	<input type="checkbox"/>	4		
9-5															
1611	Corylus cornuta ✓	Ⓔ	R			6	57.0	0.0	6.0	105		<input type="checkbox"/>	3		
9-6															
1612	Cornus amomum ✓	Ⓔ	R			19	102.0	0.0	24.0	217.5	8.0	<input type="checkbox"/>	4		
9-7															
1613	Cornus amomum ✓	Ⓔ	R			15	126.0	0.0	15.0	163	5.0	<input type="checkbox"/>	4		
9-8															
1614	Corylus cornuta ✓	Ⓔ	R			7	74.0	0.0	8.0	88		<input type="checkbox"/>	2		
9-9															
1615	Corylus cornuta ✓	Ⓔ	R			6	65.0	0.0	9.0	85.0		<input type="checkbox"/>	4		
9-10															
1616	Cornus amomum ✓	Ⓔ	R			11	96.0	0.0	14.0	141	3.0	<input type="checkbox"/>	3		
9-11															
1619	Platanus occidentalis ✓	Ⓔ	R			12	113.0	0.0	26.0	264.0	13	<input type="checkbox"/>	4		
9-14															
1620	Platanus occidentalis ✓	Ⓔ	R			14	101.0	0.0	18.0	166	9.0	<input type="checkbox"/>	4		
9-15															
1621	Fraxinus pennsylvanica ✓	Ⓔ	R			9	85.0	0.0	17.0	122	4	<input type="checkbox"/>	2		
9-16															
1622	Platanus occidentalis ✓	Ⓔ	R			19	119.0	0.0	37.0	212	17	<input type="checkbox"/>	4		
9-17															

# stems: 14 New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	ddh 1 mm	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes

\*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown p. 18  
 \*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing  
 \*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSepts, GAME, LIVESTock, Other/Unknown ANIMAL, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUGHT, STORM, HURRICane, DISeased, VINE Strangulation, UNKNown, specify other.  
 \*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m. Printed in the CVS-EEP Entry Tool ver. 2.2.7

**Plot 92759-01-0010**

Please fill in any missing data and fix incorrect data.

**Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5):  Date:  -  /  /

Taxonomic Standard:  Party:  Role:

Taxonomic Standard DATE:

Latitude or UTM-N:  Datum:  Notes on plot:

(dec.deg. or m)

Longitude or UTM-E:  UTM Zone:

Coordinate Accuracy (m):  X-Axis bearing (deg):

Plot Dimensions: X:  Y:   Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X)

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Nov 2010 Data			THIS YEAR'S DATA						
						ddh 1 mm	Height 1cm*	DBH 1 cm	ddh 1mm	Height 1cm*	DBH 1 cm	Re- sprout	Vigor*	Damage*	Notes
1623	Betula nigra ✓	Ⓔ	R			11	91.0	0.0	65	7270	31	<input type="checkbox"/>	4		
10-1															
1624	Celtis laevigata ✓	Ⓔ	R			5	51.0	0.0	5	48		<input type="checkbox"/>	1		
10-2															
1625	Quercus laurifolia ✓	Ⓔ	R			7	72.0	0.0	30	238	17	<input type="checkbox"/>	4		
10-3															
1626	Quercus michauxii ✓	Ⓔ	R			8	31.0	0.0	21	148	9	<input type="checkbox"/>	4		
10-4															
1627	Cornus amomum ✓	Ⓔ	R			10	132.0	3.0	22	205	6	<input type="checkbox"/>	4		
10-5															
1628	Quercus michauxii ✓	Ⓔ	R			6	82.0	0.0	15	101		<input type="checkbox"/>	3		
10-6															
1629	Nyssa sylvatica ✓	Ⓔ	R			6	73.0	0.0	12	98		<input type="checkbox"/>	4		
10-7															
1630	Nyssa sylvatica ✓	Ⓔ	R			8	89.0	0.0	17	144	4	<input type="checkbox"/>	4		
10-8															
1631	Platanus occidentalis	Ⓔ	R			8	53.0	0.0				<input type="checkbox"/>	0		
10-9															
1632	Betula nigra ✓	Ⓔ	R			9	100.0	0.0	64	7270	40	<input type="checkbox"/>	4		
10-10															
1633	Platanus occidentalis ✓	Ⓔ	R			16	162.0	6.0	47	7270	30	<input type="checkbox"/>	4		
10-11															
1634	Celtis laevigata ✓	Ⓔ	R			6	110.0	0.0	18	145	5	<input type="checkbox"/>	3		
10-12															
1635	Cornus amomum ✓	Ⓔ	R			5	67.0	0.0	25	195	11	<input type="checkbox"/>	4		
10-13															
1636	Cornus amomum ✓	Ⓔ	R			8	88.0	0.0	19	129		<input type="checkbox"/>	4		
10-14															
1637	Nyssa sylvatica ✓	Ⓔ	R			4	58.0	0.0	15	121		<input type="checkbox"/>	4		
10-15															
1638	Cornus amomum ✓	Ⓔ	R			3	35.0	0.0	16	141	4	<input type="checkbox"/>	4		
10-16															

\*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown p. 20

\*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing

\*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSEcts, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUGHT, STORM, HURRICane, DISeased, VINE Strangulation, UNKNown, specify other.

\*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Printed in the CVS-EEP Entry Tool ver. 2.2.7



**Plot 92759-01-0011**

Please fill in any missing data and fix incorrect data.

**Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5):  Date:  -  Party:  Role:

Taxonomic Standard:

Taxonomic Standard DATE:

Latitude or UTM-N:  (dec.deg. or m) Datum:

Longitude or UTM-E:  UTM Zone:

Coordinate Accuracy (m):  X-Axis bearing (deg):

Plot Dimensions: X:  Y:   Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X)

Notes on plot:

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Nov 2010 Data			THIS YEAR'S DATA						
						ddh 1 mm	Height 1cm*	DBH 1 cm	ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1639	Quercus michauxii ✓	(E)	R			16	109.0	0.0	31	197	12	<input type="checkbox"/>	4		
11-1															
1640	Quercus nigra ✓	(E)	R			4	40.0	0.0	7	53		<input type="checkbox"/>	3		
11-2															
1641	Quercus nigra ✓	(E)	R			7	72.0	0.0	21	110		<input type="checkbox"/>	4		
11-3															
1642	Quercus falcata ✓	(E)	R			10	88.0	0.0	19	137	6	<input type="checkbox"/>	4		
11-4															
1643	Quercus falcata ✓	(E)	R			13	116.0	0.0	27	182	10	<input type="checkbox"/>	4		
11-5															
1644	Quercus laurifolia ✓	(E)	R			11	98.0	0.0	27	202	6	<input type="checkbox"/>	4		
11-6															
1645	Quercus laurifolia ✓	(E)	R			10	88.0	0.0	20	153	6	<input type="checkbox"/>	4		
11-7															
1646	Betula nigra ✓	(E)	R			12	102.0	0.0	15	99		<input type="checkbox"/>	3		
11-8															
1647	Fraxinus pennsylvanica ✓	(E)	R			8	49.0	0.0	9	69		<input type="checkbox"/>	2		
11-9															
1648	Quercus falcata ✓	(E)	R			10	89.0	0.0	20	155	5	<input type="checkbox"/>	4		
11-10															
1649	Quercus falcata ✓	(E)	R			13	119.0	0.0	23	195	8	<input type="checkbox"/>	4		
11-11															
1650	Quercus michauxii ✓	(E)	R			17	148.0	6.0	26	209	12	<input type="checkbox"/>	4		
11-12															

# stems: 12 New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	ddh 1 mm	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes

\*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown p. 23  
 \*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing  
 \*DAMAGE: REMOval, CUT, MOWing, BEAVer, DEER, RODents, INSEcts, GAME, LIVESTock, Other/Unknown ANIMAl, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUGHT, STORM, HURRICane, DISeased, VINE Strangulation, UNKNown, specify other.  
 \*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m. Printed in the CVS-EPP Entry Tool ver. 2.2.7

**Plot 92759-01-0012**

Please fill in any missing data and fix incorrect data.

**Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5):  Date:  -  Party:  Role:  Notes on plot:

Taxonomic Standard:

Taxonomic Standard DATE:

Latitude or UTM-N:  Datum:

(dec.deg. or m)

Longitude or UTM-E:  UTM Zone:

Coordinate Accuracy (m):  X-Axis bearing (deg):

Plot Dimensions: X:  Y:   Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X)

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Nov 2010 Data			THIS YEAR'S DATA						
						ddh 1 mm	Height 1cm*	DBH 1 cm	ddh 1mm	Height 1cm*	DBH 1 cm	Re- sprout	Vigor*	Damage*	Notes
1651	Quercus falcata ✓	Ⓔ	R			7	63.0	0.0	16	103		<input type="checkbox"/>	4		
12-1															
1652	Quercus laurifolia ✓	Ⓔ	R			10	116.0	0.0	24	194	9	<input type="checkbox"/>	4		
12-2															
1653	Quercus laurifolia ✓	Ⓔ	R			8	96.0	0.0	15	120		<input type="checkbox"/>	4		
12-3															
1654	Quercus laurifolia ✓	Ⓔ	R			13	144.0	5.0	27	222	11	<input type="checkbox"/>	4		
12-4															
1655	Liriodendron tulipifera ✓	Ⓔ	R			8	75.0	0.0	16	138	5	<input type="checkbox"/>	4		
12-5															
1656	Quercus falcata ✓	Ⓔ	R			6	73.0	0.0	10	82		<input type="checkbox"/>	3		
12-6															
1657	Quercus michauxii ✓	Ⓔ	R			17	126.0	0.0	39	179	15	<input type="checkbox"/>	4		
12-7															
1658	Quercus michauxii ✓	Ⓔ	R			5	61.0	0.0	10	91		<input type="checkbox"/>	3		
12-8															
1659	Betula nigra ✓	Ⓔ	R			31	261.0	14.0	49	270	18	<input type="checkbox"/>	4		
12-9															
1660	Betula nigra ✓	Ⓔ	R			29	153.0	4.0	56	247	15	<input type="checkbox"/>	4		
12-10															
1661	Betula nigra ✓	Ⓔ	R			22	155.0	5.0	32	179	6	<input type="checkbox"/>	4		
12-11															
1662	Liriodendron tulipifera ✓	Ⓔ	R			19	99.0	0.0	27	153	7	<input type="checkbox"/>	4		
12-12															
1663	Quercus falcata ✓	Ⓔ	R			24	175.0	5.0	39	228	12	<input type="checkbox"/>	4		
12-13															
1665	Quercus falcata ✓	Ⓔ	R			4	18.0	0.0	5	30		<input type="checkbox"/>	1		
12-15															
1666	Betula nigra	Ⓔ	R			19	109.0	0.0				<input type="checkbox"/>	0		
12-16															

# stems: 15 New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	ddh 1 mm	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes

\*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown p. 25

\*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing. \*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INsects, GAME, LIVESTock, Other/Unknown ANIMAL, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUGHT, STORM, HURRICane, DISeased, VINE Strangulation, UNKNown, specify other.

\*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m. Printed in the CVS-EEP Entry Tool ver. 2.2.7

**Plot 92759-01-0013**

Please fill in any missing data and fix incorrect data.

**Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5):  Date:  -  /

Taxonomic Standard:

Taxonomic Standard DATE:

Latitude or UTM-N:  (dec.deg. or m) Datum:

Longitude or UTM-E:  UTM Zone:

Coordinate Accuracy (m):

Plot Dimensions: X:  Y:   Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X)

Party:  Role:

Notes on plot:

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Nov 2015 Data			THIS YEAR'S DATA						
						ddh 1 mm	Height 1cm*	DBH 1 cm	ddfi 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
528 13-1	Quercus falcata ✓	Ⓔ	R			0	6.0	0.0	10	105		<input type="checkbox"/>	4		
529 13-2	Carya ovata	Ⓔ	R			7	27.0	0.0				<input type="checkbox"/>	0		
530 13-3	Carpinus caroliniana ✓	Ⓔ	R			6	10.0	0.0	11	65		<input type="checkbox"/>	3		
531 13-4	Platanus occidentalis ✓	Ⓔ	R			17	136.0	5.0	30	246	12	<input type="checkbox"/>	4	1	
533 13-6	Platanus occidentalis ✓	Ⓔ	R			18	24.0	0.0	34	207	10	<input type="checkbox"/>	4		
534 13-7	Quercus michauxii ✓	Ⓔ	R			0	0.0	0.0	10	106		<input type="checkbox"/>	3		
535 13-8	Quercus nigra ✓	Ⓔ	R			0	0.0	0.0	15	145	6	<input type="checkbox"/>	4		
537 13-10	Quercus falcata ✓	Ⓔ	R			9	73.0	0.0	25	156	9	<input type="checkbox"/>	4		
538 13-11	Liriodendron tulipifera ✓	Ⓔ	R			11	76.0	0.0	26	158	6	<input type="checkbox"/>	4		
539 13-12	Liriodendron tulipifera ✓	Ⓔ	R			8	29.0	0.0	11	72		<input type="checkbox"/>	3		
540 13-13	Platanus occidentalis ✓	Ⓔ	R			15	73.0	0.0	21	131	6	<input type="checkbox"/>	3		
541 13-14	Quercus falcata ✓	Ⓔ	R			8	60.0	0.0	14	117		<input type="checkbox"/>	3		

# stems: 12 New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	ddh 1 mm	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes
3-15 <i>Worms glabra</i>				9	3.02		2	92.0 cm	Volunteer
3-16 <i>Fraxinus pennsylvanica</i>				23	6.17	11	4	188.1 cm	Volunteer

17 16  
14 6  
4

\*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown p. 27  
 \*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing. \*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INsects, GAME, LIVESTock, Other/Unknown  
 ANIMAL, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUGHT, STORM, HURRICane, DISeased, VINE, Strangulation, UNKNown, specify other.  
 \*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m. Printed in the CVS-EEP Entry Tool-ver. 2.2.7

**Plot 92759-01-0014**

Please fill in any missing data and fix incorrect data.

**Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5):  Date:  -  Party:  Role:  Notes on plot:

Taxonomic Standard:

Taxonomic Standard DATE:

Latitude or UTM-N:  Datum:

(dec.deg. or m)

Longitude or UTM-E:  UTM Zone:

Coordinate Accuracy (m):  X-Axis bearing (deg):

Plot Dimensions: X:  Y:   Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X)

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Nov 2010 Data			THIS YEAR'S DATA						
						ddh 1 mm	Height 1cm*	DBH 1 cm	ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
542 14-1	Cornus amomum ✓	Ⓔ	R			13	47.0	0.0	11	86		<input type="checkbox"/>	4		
543 14-2	Cornus amomum ✓	Ⓔ	R			6	46.0	0.0	10	75		<input type="checkbox"/>	3		
544 14-3	Cornus amomum ✓	Ⓔ	R			7	70.0	0.0	10	101		<input type="checkbox"/>	4		
547 14-6	Quercus laurifolia ✓	Ⓔ	R			7	48.0	0.0	20	125	4	<input type="checkbox"/>	4		
549 14-8	Cornus amomum ✓	Ⓔ	R			12	41.0	0.0	12	63		<input type="checkbox"/>	1		MULT. DEAD STEMS
550 14-9	Cornus amomum	Ⓔ	R			5	30.0	0.0				<input type="checkbox"/>	0		
551 14-10	Cornus amomum	Ⓔ	R			5	30.0	0.0				<input type="checkbox"/>	0		
552 14-11	Quercus falcata ✓	Ⓔ	R			6	36.0	0.0	11	118		<input type="checkbox"/>	4		

# stems: 8 New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	ddh 1 mm	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes
14.12 Quercus (small chestnut)	R			7	2.07'		2	63.1 cm	Replanted.
14.13 Quercus falcata	R			5	1.95'		2	59.4 cm	Replanted.
14.14 Quercus (sunip) 2	R			5	1.43'		2	43.6 cm	Replanted.

# All in foot  
QUERCUS michauxii

\*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown p. 29  
 \*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing  
 \*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSEcts, GAME, LIVESTock, Other/Unknown  
 ANIMAl, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUGHT, STORM, HURRICane, DISeased, VINE Strangulation, UNKNOwn, specify other.  
 \*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.  
 Printed in the CVS-EPP Entry Tool ver. 2.2.7

**Plot 92759-01-0015**

Please fill in any missing data and fix incorrect data.

Vegetation Monitoring Data (VMD) Datasheet

VMD Year (1-5):  Date:  -  Party:  Role:  Notes on plot:

Taxonomic Standard:

Taxonomic Standard DATE:

Latitude or UTM-N:  Datum:

(dec.deg. or m)

Longitude or UTM-E:  UTM Zone:

Coordinate Accuracy (m):  X-Axis bearing (deg):

Plot Dimensions: X:  Y:   Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X)

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Nov 2010 Data			THIS YEAR'S DATA						
						ddh 1 mm	Height 1cm*	DBH 1 cm	ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1668	Liriodendron tulipifera ✓	(E)	R			11	95.0	0.0	21	102		<input type="checkbox"/>	4		
15-2															
1669	Liriodendron tulipifera ✓	(E)	R			5	47.0	0.0	11	73		<input type="checkbox"/>	2		
15-3															
1670	Liriodendron tulipifera ✓	(E)	R			9	65.0	0.0	13	97		<input type="checkbox"/>	2		
15-4	New Growth														
1671	Quercus laurifolia	(E)	R			6	33.0	0.0				<input type="checkbox"/>	0		
15-5															
1674	Quercus falcata ✓	(E)	R			11	130.0	0.0	29	232	13	<input type="checkbox"/>	4		
15-8															
1675	Quercus falcata ✓	(E)	R			6	51.0	0.0	17	141	7	<input type="checkbox"/>	4		
15-9															
1676	Quercus falcata ✓	(E)	R			9	97.0	0.0	25	201	11	<input type="checkbox"/>	4		
15-10															
1680	Carya ovata ✓	(E)	R			7	54.0	0.0	16	135	5	<input type="checkbox"/>	2		
15-14															
1681	Fraxinus pennsylvanica ✓	(E)	R			16	130.0	0.0	32	232	15	<input type="checkbox"/>	4		
15-15															
1682	Quercus laurifolia ✓	(E)	R			6	85.0	0.0	17	127	5	<input type="checkbox"/>	3		
15-16															

# stems: 10 New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	ddh 1 mm	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes

\*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown p. 31  
 \*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing. \*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSEcts, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUGHT, STORM, HURRICane, DISeased, VINE Strangulation, UNKNown, specify other.  
 \*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m. Printed in the CVS-EPP Entry Tool ver. 2.2.7

**Plot 92759-01-0016**

Please fill in any missing data and fix incorrect data.

Vegetation Monitoring  
Data (VMD) Datasheet

VMD Year (1-5):  Date:  -  Party:  Role:  Notes on plot:

Taxonomic Standard:

Taxonomic Standard DATE:

Latitude or UTM-N:  (dec.deg. or m) Datum:

Longitude or UTM-E:  UTM Zone:

Coordinate Accuracy (m):  X-Axis bearing (deg):

Plot Dimensions: X:  Y:   Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X)

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Nov 2010 Data			THIS YEAR'S DATA						
						ddh 1 mm	Height 1cm*	DBH 1 cm	ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1683	Cornus amomum ✓	Ⓔ	R			5	35.0	0.0	7	70	-	<input type="checkbox"/>	3		
16-1															
1684	Celtis laevigata ✓	Ⓔ	R			6	61.0	0.0	9	72	-	<input type="checkbox"/>	3		
16-2															
1685	Quercus michauxii ✓	Ⓔ	R			20	173.0	13.0	39	256	25	<input type="checkbox"/>	4		
16-3															
1686	Quercus michauxii ✓	Ⓔ	R			13	132.0	5.0	26	212	15	<input type="checkbox"/>	4		
16-4															
1687	Quercus falcata ✓	Ⓔ	R			18	214.0	10.0	36	270	20	<input type="checkbox"/>	4		
16-5															
1688	Cornus amomum ✓	Ⓔ	R			10	153.0	4.0	25	259	13	<input type="checkbox"/>	4		
16-6															
1689	Cornus amomum ✓	Ⓔ	R			12	136.0	5.0	20	227	11	<input type="checkbox"/>	4		
16-7															
1690	Cornus amomum ✓	Ⓔ	R			11	104.0	0.0	27	188	6	<input type="checkbox"/>	4		
16-8															
1691	Cornus amomum ✓	Ⓔ	R			6	59.0	0.0	14	111	-	<input type="checkbox"/>	4		
16-9															
1692	Celtis laevigata ✓	Ⓔ	R			2	32.0	0.0	7	81	-	<input type="checkbox"/>	3		
16-10															
1693	Cornus amomum ✓	Ⓔ	R			7	99.0	0.0	20	143	4	<input type="checkbox"/>	4		
16-11															
1694	Cornus amomum ✓	Ⓔ	R			8	88.0	0.0	20	130	5	<input type="checkbox"/>	4		
16-12															
1695	Celtis laevigata ✓	Ⓔ	R			3	45.0	0.0	7	43	-	<input type="checkbox"/>	1		
16-13															
1696	Quercus nigra	Ⓔ	R			15	99.0	0.0	22	139	7	<input type="checkbox"/>	4		
16-14															

# stems: 14 New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	ddh 1 mm	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes
Quercus falcata	R			4	119.6		3	59.7 cm	Replanted

all measurements in feet

\*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown p. 33  
 \*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing  
 \*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSEcts, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRICane, DISeased, VINE Strangulation, UNKNOwn, specify other.  
 \*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m. Printed in the CVS-EEP Entry Tool ver. 2.2.7

**Plot 92759-01-0017**

Please fill in any missing data and fix incorrect data.

Vegetation Monitoring Data (VMD) Datasheet

VMD Year (1-5):  Date:  -  /  Party:  Role:  Notes on plot:

Taxonomic Standard:

Taxonomic Standard DATE:

Latitude or UTM-N:  Datum:  (dec.deg. or m)

Longitude or UTM-E:  UTM Zone:

Coordinate Accuracy (m):  X-Axis bearing (deg):

Plot Dimensions: X:  Y:   Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X)

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Nov 2010 Data			THIS YEAR'S DATA						
						ddh 1 mm	Height 1 cm*	DBH 1 cm	ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1697	Ulmus americana ✓	(E)	R			18	77.0	0.0	30	137	7	<input type="checkbox"/>	3		
17-1															
1699	Fraxinus pennsylvanica ✓	(E)	R			18	103.0	0.0	29	187	10	<input type="checkbox"/>	4		
17-3															
1700	Fraxinus pennsylvanica ✓	(E)	R			22	130.0	0.0	40	207	10	<input type="checkbox"/>	4		
17-4															
1702	Platanus occidentalis ✓	(E)	R			29	209.0	13.0	50	270	26	<input type="checkbox"/>	4		
17-6															
1703	Platanus occidentalis ✓	(E)	R			0	Missing	0.0	-	-	-	<input type="checkbox"/>	0		
17-7															
1704	Quercus falcata ✓	(E)	R			0	Missing	0.0	42	230	16	<input type="checkbox"/>	4		
17-8															
1706	Platanus occidentalis ✓	(E)	R			0	Missing	0.0	-	-	-	<input type="checkbox"/>	0		
17-10															
1707	Quercus laurifolia ✓	(E)	R			0	Missing	0.0	5	50	-	<input type="checkbox"/>	3		
17-11															
1708	Quercus nigra ✓	(E)	R			6	40.0	0.0	6	46	-	<input type="checkbox"/>	2		
17-12															

# stems: 9 New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	ddh 1 mm	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes
17-13 Platanus Occidentalis	R			9	2.45		2	74.7 cm	
17-14 Platanus Occidentalis	R			13	3.84		3	117.0 cm	

17-5 qm - 37 | 165 | 10 | 4

\*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown p. 35  
 \*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing  
 \*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSEcts, GAME, LIVESTock, Other/Unknown ANIMAL, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRricane, DISeased, VINE Strangulation, UNKNown, specify other.  
 \*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m. Printed in the CVS-EEP Entry Tool ver. 2.2.7

## **TABLES C.1 THROUGH C.7**



**Table C.1. Vegetation Metadata**

<b>Little River Farm Site: Project No. 000623</b>	
<b>Report Prepared By</b>	Kristi Suggs
<b>Date Prepared</b>	12/14/2011 15:24
<b>database name</b>	cvs-EEP-entrytool-v2.2.7.mdb
<b>database location</b>	L:\Users\KSuggs
<b>computer name</b>	CHABLDNEAL2
<b>file size</b>	47611904
<b>DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT-----</b>	
<b>Metadata</b>	Description of database file, the report worksheets, and a summary of project(s) and project data.
<b>Proj, planted</b>	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
<b>Proj, total stems</b>	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.
<b>Plots</b>	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
<b>Vigor</b>	Frequency distribution of vigor classes for stems for all plots.
<b>Vigor by Spp</b>	Frequency distribution of vigor classes listed by species.
<b>Damage</b>	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
<b>Damage by Spp</b>	Damage values tallied by type for each species.
<b>Damage by Plot</b>	Damage values tallied by type for each plot.
<b>Planted Stems by Plot and Spp</b>	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
<b>PROJECT SUMMARY-----</b>	
<b>Project Code</b>	92759
<b>project Name</b>	Little River Farm
<b>Description</b>	Stream Enhancement, Restoration, and Preservation Project
<b>River Basin</b>	Yadkin-Pee Dee
<b>length(ft)</b>	578 ft
<b>stream-to-edge width (ft)</b>	56 ft
<b>area (sq m)</b>	80937.13
<b>Required Plots (calculated)</b>	17
<b>Sampled Plots</b>	17

**Table C.2. Vegetation Vigor by Species**

<b>Little River Farm Site: Project No. 000623</b>									
	<b>Species</b>	<b>CommonName</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>Missing</b>	<b>Unknown</b>
	Asimina triloba	pawpaw				3			
	Betula nigra	river birch	11	1	1	2	1		
	Carya ovata	shagbark hickory			2		2		
	Celtis laevigata	sugarberry	1	3	1	2		1	
	Cornus amomum	silky dogwood	24	5	1	1	2		
	Cornus florida	flowering dogwood	2	1					
	Fraxinus pennsylvanica	green ash	6	2	7	1			
	Nyssa sylvatica	blackgum	3	1	1				
	Quercus falcata	southern red oak	16	5	1	1	2		
	Quercus laurifolia	laurel oak	10	3	1	3	3		
	Quercus michauxii	swamp chestnut oak	13	5	6	2	3		
	Quercus nigra	water oak	3	1	1				
	Ulmus alata	winged elm			1				
	Carpinus caroliniana	American hornbeam		3	1				
	Corylus cornuta	beaked hazelnut	1	4	2	2	3		
	Liriodendron tulipifera	tuliptree	5	3	4	1	6		
	Platanus occidentalis	American sycamore	10	1	6	1	3		
	Ulmus americana	American elm		1					
<b>TOT:</b>	<b>18</b>	<b>18</b>	<b>105</b>	<b>39</b>	<b>36</b>	<b>19</b>	<b>25</b>	<b>1</b>	

**Table C.3. Vegetation Damage by Species**

<b>Little River Farm Site: Project No. 000623</b>						
<i>Species</i>	<i>CommonName</i>	<i>Count of Damage Categories</i>				
		<i>(No damage)</i>	<i>(Other)</i>	<i>Cut</i>		
Asimina triloba	pawpaw	1	2	1		
Betula nigra	river birch	2	14	1	1	
Carpinus caroliniana	American hornbeam	0	4			
Carya ovata	shagbark hickory	0	4			
Celtis laevigata	sugarberry	0	8			
Cornus amomum	silky dogwood	1	32	1		
Cornus florida	flowering dogwood	0	3			
Corylus cornuta	beaked hazelnut	0	12			
Fraxinus pennsylvanica	green ash	0	16			
Liriodendron tulipifera	tuliptree	0	19			
Nyssa sylvatica	blackgum	0	5			
Platanus occidentalis	American sycamore	1	20		1	
Quercus falcata	southern red oak	1	24	1		
Quercus laurifolia	laurel oak	4	16	1	3	
Quercus michauxii	swamp chestnut oak	2	27	1	1	
Quercus nigra	water oak	0	5			
Ulmus alata	winged elm	0	1			
Ulmus americana	American elm	0	1			
<b>TOT:</b>	<b>18</b>	<b>18</b>	<b>12</b>	<b>213</b>	<b>6</b>	<b>6</b>

**Table C.4. Vegetation Damage by Plot**

<b>Little River Farm Site: Project No. 000623</b>					
<i>Plot</i>	<i>Count of Damage Categories</i>	<i>(No damage)</i>	<i>(Other)</i>	<i>Cut</i>	
92759-01-0001-year:2	0	12			
92759-01-0002-year:2	1	14	1		
92759-01-0003-year:2	3	9		3	
92759-01-0004-year:2	3	8		3	
92759-01-0005-year:2	0	11			
92759-01-0006-year:2	1	18	1		
92759-01-0007-year:2	1	12	1		
92759-01-0008-year:2	2	11	2		
92759-01-0009-year:2	1	13	1		
92759-01-0010-year:2	0	16			
92759-01-0011-year:2	0	12			
92759-01-0012-year:2	0	15			
92759-01-0013-year:2	0	14			
92759-01-0014-year:2	0	11			
92759-01-0015-year:2	0	10			
92759-01-0016-year:2	0	15			
92759-01-0017-year:2	0	12			
<b>TOT:</b>	<b>17</b>	<b>12</b>	<b>213</b>	<b>6</b>	<b>6</b>

Table C.5. Vegetation Damage by Plot

Little River Farm Site: Project No. 000623

Comment	Species	Common Name	Total Planted Stems			Plot																																			
			# Plots	Avg# Stems		Plot 92759-01-0001-year:2	Plot 92759-01-0002-year:2	Plot 92759-01-0003-year:2	Plot 92759-01-0004-year:2	Plot 92759-01-0005-year:2	Plot 92759-01-0006-year:2	Plot 92759-01-0007-year:2	Plot 92759-01-0008-year:2	Plot 92759-01-0009-year:2	Plot 92759-01-0010-year:2	Plot 92759-01-0011-year:2	Plot 92759-01-0012-year:2	Plot 92759-01-0013-year:2	Plot 92759-01-0014-year:2	Plot 92759-01-0015-year:2	Plot 92759-01-0016-year:2	Plot 92759-01-0017-year:2																			
	Asimina triloba	pawpaw	3	2	1.5											1																									
	Betula nigra	river birch	15	8	1.88	1			3	1				2		2		2	1	3								37													
	Carpinus caroliniana	American hornbeam	4	2	2									3										1																	
	Carya ovata	shagbark hickory	2	2	1	1																																1			
	Celtis laevigata	sugarberry	7	4	1.75					1	1								2																				3		
	Cornus amomum	silky dogwood	31	5	6.2			12										4	4								4												7		
	Cornus florida	flowering dogwood	3	1	3									3																											
	Corylus cornuta	beaked hazelnut	9	5	1.8	1	1	3			1								3																						
	Fraxinus pennsylvanica	green ash	16	8	2	1							6		3	1			1						1												1		2		
	Liriodendron tulipifera	tuliptree	13	6	2.17	4							1			1							2	2														3			
	Nyssa sylvatica	blackgum	5	2	2.5	2													3																						
	Platanus occidentalis	American sycamore	18	8	2.25			1	1				4		2	3	1									3														3	
	Quercus falcata	southern red oak	23	10	2.3	1	1										2			4	4	3	2														3	2	1		
	Quercus laurifolia	laurel oak	17	9	1.89								4			2	2		1	2	3				1													1		1	
	Quercus michauxii	swamp chestnut oak	26	14	1.86				3	2	3	1	2	2	2	1	2	2	2	2	2	1	2																	2	1
	Quercus nigra	water oak	5	4	1.25															2																			1	1	
	Ulmus alata	winged elm	1	1	1																																				
	Ulmus americana	American elm	1	1	1																																			1	
<b>TOT:</b>	<b>0</b>	<b>18</b>	<b>18</b>	<b>199</b>	<b>18</b>		<b>11</b>	<b>15</b>	<b>10</b>	<b>8</b>	<b>11</b>	<b>16</b>	<b>5</b>	<b>12</b>	<b>14</b>	<b>15</b>	<b>12</b>	<b>14</b>	<b>13</b>								<b>9</b>	<b>15</b>	<b>10</b>												

**Table C.6. Vegetative Problem Areas**

<b>Little River Farm Site: Project No. 000623</b>			
<b>UT4</b>			
<b>Feature/Issue</b>	<b>Station # / Range</b>	<b>Probable Cause</b>	<b>Photo #</b>
Bare Bank			
Raw Bank (Right)	11+00	Poorly established streambank vegetation	C.6-1, C.6-4 through C.6-8, and C.6-10
	12+10 - 12+31	Poorly established streambank vegetation	
	12+70 - 12+80	Poorly established streambank vegetation	
	13+00 - 13+20	Poorly established streambank vegetation	
	13+65 - 13+80	Poorly established streambank vegetation	
	14+05 - 14+15	Poorly established streambank vegetation	
	14+20 - 14+32	Poorly established streambank vegetation	
Bare Bench (Left)	11+55 to 11+65	Poorly established streambank vegetation	C.6-2, C.6-3, and C.6-9
	11+75 to 11+90	Poorly established streambank vegetation	
	14+00 to 14+15	Poorly established streambank vegetation	
Bare Floodplain (Right)			
Bare Floodplain (Left)			
Invasive/Exotic Populations			

**Table C.7 Plot Species and Densities**

Little River Farm Site : Project No. 000623																					
	Plots																	Initial Totals	Year 1 Totals	Year 2 Totals	Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
<i>Asimina tuloba</i>					2			1										3	3	3	
<i>Betula nigra</i>	1		3	1		2		2		2	1	3						17	15	15	
<i>Carpinus caroliniana</i>						3							1					4	4	4	
<i>Carya ovata</i>	1														1			7	4	2	
<i>Celtis laevigata</i>				1	1					2							3	9	8	7	
<i>Cornus amomum</i>		12							4	4					4		7	34	33	31	
<i>Cornus florida</i>					3													3	3	3	
<i>Corylus cornuta</i>	1	1	3		1				3									13	12	9	
<i>Fraxinus pennsylvanica</i>	1					6		3	1		1		1		1		2	14	14	16	
<i>Liriodendron tulipifera</i>	4				1		1					2	2		3			24	19	13	
<i>Nyssa sylvatica</i>	2									3								7	5	5	
<i>Platanus occidentalis</i>		1	1			4		2	3	1			3				3	23	17	18	
<i>Quercus falcata</i> var. <i>pagodifolia</i>	1	1							2		4	4	3	2	3	2	1	28	22	23	
<i>Quercus laurifolia</i>				4			2	2		1	2	3		1	1		1	27	19	17	
<i>Quercus michauxii</i>			3	2	3	1	2	2	1	2	2	2	1	2		2	1	27	23	26	
<i>Quercus nigra</i>											2		1			1	1	5	5	5	
<i>Ulmus alata</i>													1					0	0	1	
<i>Ulmus americana</i>																	1	2	1	1	
<b>Stems/plot</b>	11	15	10	8	11	16	5	12	14	15	12	14	13	9	9	15	10	247	207	199	
<b>Stems/Acre Year 2</b>	445	607	405	324	445	647	202	486	566	607	486	566	526	364	364	607	405	N/A	N/A	N/A	<b>474</b>
<b>Stems/Acre Year 1</b>	486	607	486	324	445	688	526	526	566	647	486	607	486	324	405	566	202				<b>493</b>
<b>Stems/Acre Initial</b>	526	647	526	526	526	769	647	647	688	647	486	647	566	445	647	566	486				<b>588</b>

# **VEG PLOT PHOTOS**





**VP-1**



**VP-2**



**VP-3**



**VP-4**



**VP-5**



**VP-6**



**VP-7**



**VP-8**



**VP-9**



**VP-10**



**VP-11**



**VP-12**



**VP-13**



**VP-14**



**VP-15**



**VP-16**



**VP-17**

# **VEG PROBLEM AREA PHOTOS**



**C.6-1. Station 11+00**



**C.6-2. Station 11+55 – 11+65**



**C.6-3 Station 11+75 – 11+90**



**C.6-4. Station 12+10 – 12+31**



**C.6-5. Station 12+70 – 12+80**



**C.6-6. Station 13+00 – 13+20**



**C.6-7. Station 13+65 – 13+80**



**C.6-8. Station 14+00 – 14+15**

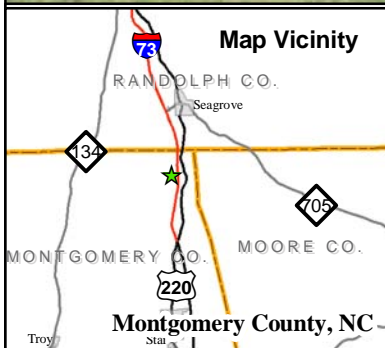
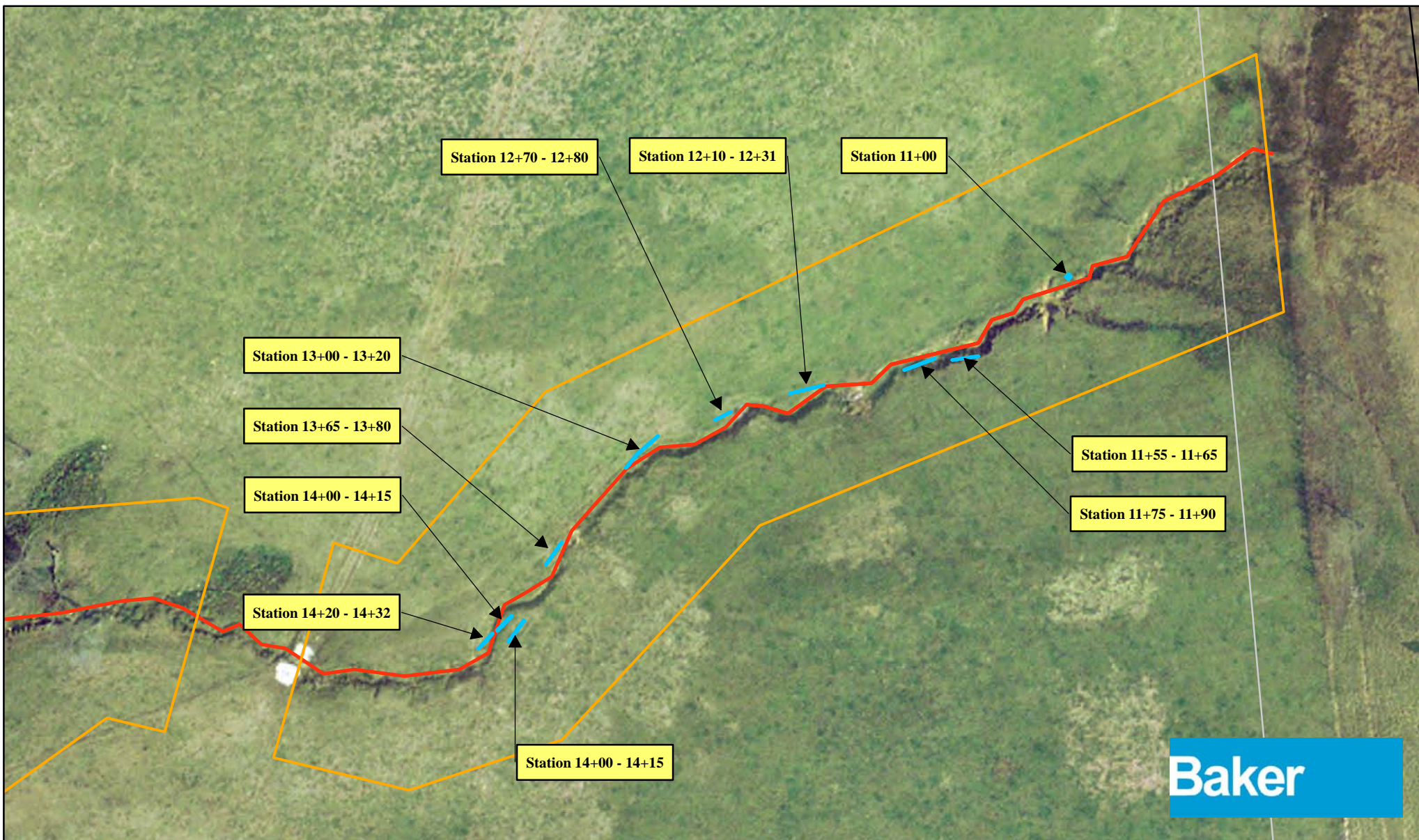


**C.6-9. Station 14+00 – 14+15**



**C.6-10. Station 14+20 – 14+32**

**VEGETATION PROBLEM AREAS**  
**FIGURE C1**



**Ecosystem Enhancement PROGRAM**

EEP Project No.: 000623

**Figure C1. UT4 Vegetation Problem Areas**  
 Little River Farm Site - Year 2 Monitoring  
 Montgomery County, NC

March 2012

**LEGEND**

- Raw Banks
- Project Centerline
- Conservation Easement
- Project Parcels
- Roads

1 inch = 60 feet

0 15 30 60 Feet



**APPENDIX D:  
AS-BUILT PLAN SHEETS**

**PROJECT: 113115 LITTLE RIVER FARM**

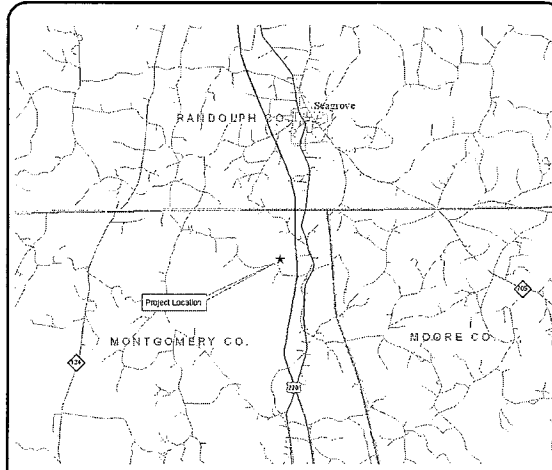
STATE	BUCE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
NC	113115	1	16

# ECOSYSTEM ENHANCEMENT PROGRAM

## MONTGOMERY COUNTY

**LOCATION: OFF US 220 AND BLACK ANKLE ROAD SR 1354**

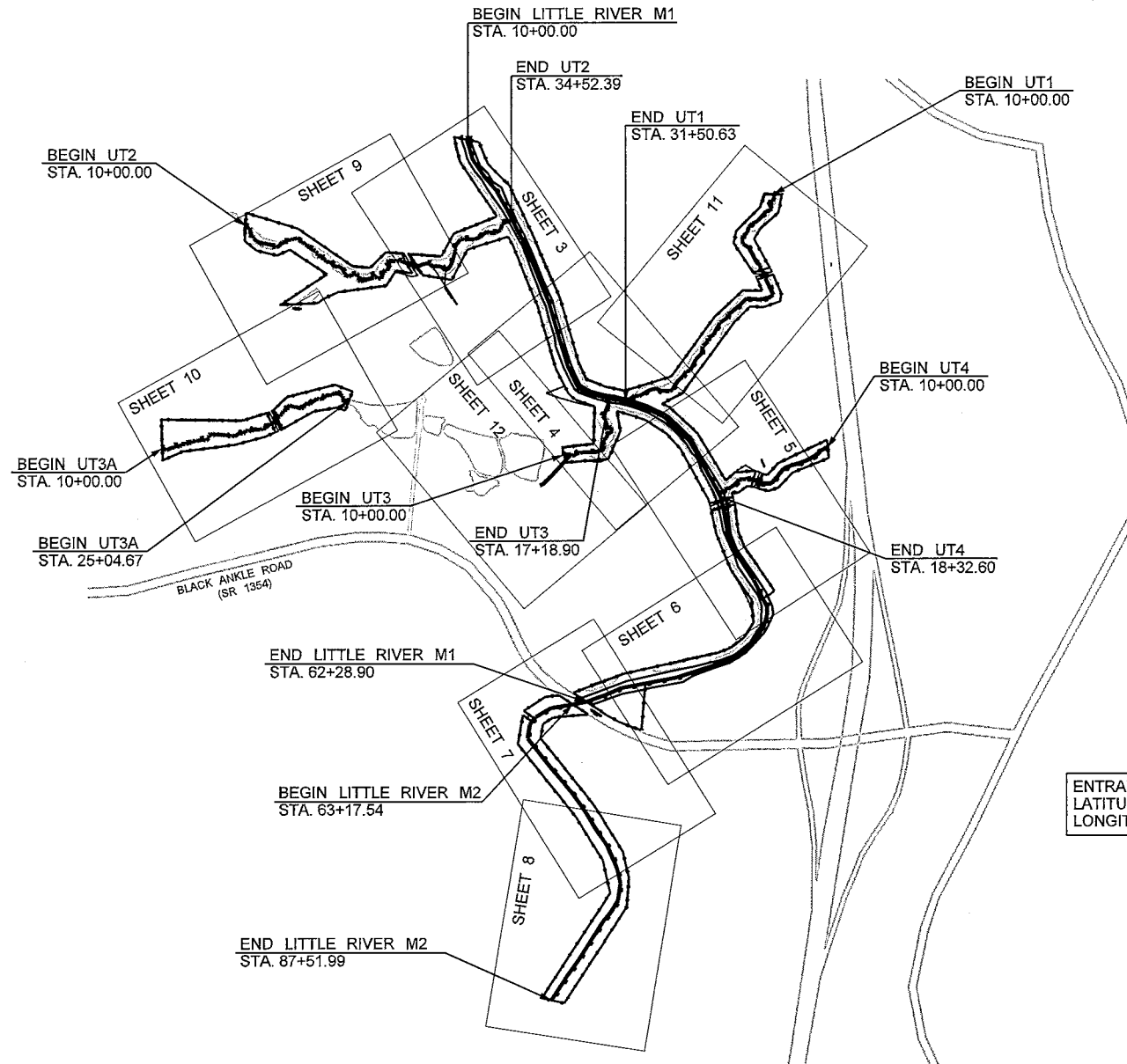
**TYPE OF WORK: AS-BUILT FOR STREAM ENHANCEMENT, PRESERVATION, AND RESTORATION**



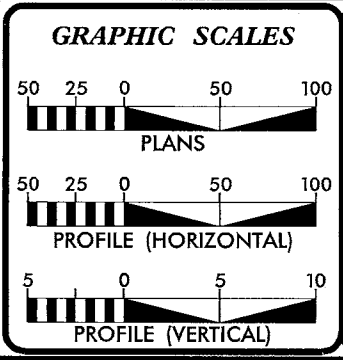
**VICINITY MAP**

**INDEX OF SHEETS**

- 1 TITLE SHEET
- 1-A STREAM CONVENTIONAL SYMBOLS  
GENERAL NOTES, STANDARD SPECIFICATIONS, AND VEGETATION SELECTION
- 1-B CONVENTIONAL SYMBOLS
- 2 TO 2-B TYPICAL POOL AND RIFFLE CROSS SECTIONS, STRUCTURE DETAILS
- 3 TO 12 PLAN VIEW OF PROPOSED AND EXISTING STREAM DESIGN



ENTRANCE ROAD OFF BLACK ANKLE ROAD LOCATED AT:  
LATITUDE: 79.7900'  
LONGITUDE: 35.4931'



PROJECT LENGTH		
	LENGTH	TYPE
LITTLE RIVER (M1)	4,103'	ENHANCEMENT II
LITTLE RIVER (M2)	2,409'	PRESERVATION
UT1	2,120'	ENHANCEMENT II
UT2	2,371'	ENHANCEMENT II
UT3	719'	ENHANCEMENT II
UT3A	1,449'	ENHANCEMENT II
UT4	782'	ENHANCEMENT II/ RESTORATION

**PREPARED FOR THE OFFICE OF:**

**CONTACT: GUY PEARCE**  
PROJECT MANAGER

**PREPARED IN THE OFFICE OF:**

**APRIL 2009**  
COMPLETION DATE:



































**KEVIN TWEEDY, PE**  
PROJECT ENGINEER

**PROJECT ENGINEER**

10-20-09  
P.E.

2/26/03



### STREAM CONVENTIONAL SYMBOLS SUPERCEDES SHEET 1B

	ROCK J-HOOK		SAFETY FENCE
	ROCK VANE		TAPE FENCE
	OUTLET PROTECTION		100 YEAR FLOOD PLAIN
	ROCK CROSS VANE		CONSERVATION EASEMENT
	DOUBLE DROP ROCK CROSS VANE		EXISTING MAJOR CONTOUR
	SINGLE WING DEFLECTOR		EXISTING MINOR CONTOUR
	DOUBLE WING DEFLECTOR		FOOT BRIDGE
	TEMPORARY SILT CHECK		TEMPORARY STREAM CROSSING
	ROOT WAD		PERMANENT STREAM CROSSING
	LOG J-HOOK		TRANSPLANTED VEGETATION
	LOG VANE		TREE REMOVAL
	LOG WEIR		TREE PROTECTION
	LOG CROSS VANE		DITCH PLUG
	CONSTRUCTED RIFFLE		TRANSPLANTS
	BOULDER CLUSTER		CHANNEL FILL
	ROCK STEP POOL		LOG STEP POOL
			CROSS SECTIONS
			PHOTO POINT / CREST GAUGE

\*\*NOTE: ALL ITEMS ABOVE MAY NOT BE USED ON THIS PROJECT

### GENERAL NOTES

1. CONSTRUCTION WAS COMPLETED IN APRIL 2009.
2. CONTRACTOR SHOULD CALL NORTH CAROLINA "ONE-CALL" BEFORE EXCAVATION STARTS. (1-800-632-4949)

PROJECT REFERENCE NO. <b>113115</b>	SHEET NO. <b>1-A</b>
PROJECT ENGINEER	
	APPROVED BY: 
	DATE: <b>10-20-09</b>
<b>Baker</b>	
<small>Michael Baker Engineering Inc. 8000 Regency Parkway Suite 200 Cary, NORTH CAROLINA 27518 Phone: 919.463.5455 Fax: 919.463.5490</small>	

### STANDARD SPECIFICATIONS

#### EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL JUNE 2006

- 6.06 TEMPORARY GRAVEL CONSTRUCTION ENTRANCE
- 6.60 TEMPORARY SEDIMENT TRAP
- 6.62 SILT FENCE
- 6.63 TEMPORARY ROCK DAM
- 6.70 TEMPORARY STREAM CROSSING

### VEGETATION SELECTION

Scientific Name	Common Name	Percent Planted by Species	Total Number of Stems
<b>Bare Root Trees Species</b>			
<i>Betula nigra</i>	River Birch	5%	403
<i>Carya ovata</i>	Shagbark Hickory	10%	806
<i>Celtis lavigata</i>	Sugarberry	5%	403
<i>Fraxinus pennsylvanica</i>	Green Ash	5%	403
<i>Liriodendron tulipifera</i>	Tulip Poplar	5%	403
<i>Nyssa salivatica</i>	Black Gum	5%	403
<i>Platanus occidentalis</i>	Sycamore	5%	403
<i>Quercus falcata var. pagodifolia</i>	Southern Red Oak	10%	806
<i>Quercus laurifolia</i>	Laurel Oak	10%	806
<i>Quercus michauxii</i>	Swamp Chestnut Oak	15%	1,209
<i>Quercus nigra</i>	Water Oak	10%	806
<i>Ulmus americana</i>	American Elm	15%	1,209
<b>Shrub Species</b>			
<i>Asimina triloba</i>	Paw Paw	20%	644
<i>Carpinus carolinianum</i>	Ironwood	20%	644
<i>Cornus amomum</i>	Silky Dogwood	20%	644
<i>Cornus florida</i>	Flowering Dogwood	10%	322
<i>Corylus cornuta</i>	Hazelnut	15%	483
<i>Lindera benzoin</i>	Spicebush	15%	483

Native Herbaceous Species			
<i>Agrostis alba</i>	Redtop	10%	N/A
<i>Andropogon gerardii</i>	Big blue stem	5%	N/A
<i>Bindens aristosa</i>	Tickseed	10%	N/A
<i>Coreopsis lanceolata</i>	Lance-leaved coreopsis	10%	N/A
<i>Elymus virginicus</i>	Virginia wildrye	15%	N/A
<i>Juncus effusus</i>	Soft rush	5%	N/A
<i>Panicum clandestinum</i>	Deer tongue	10%	N/A
<i>Panicum virgatum</i>	Switch grass	15%	N/A
<i>Polygonum pennsylvanicum</i>	Pennsylvania smartweed	5%	N/A
<i>Schizachyrium scoparium</i>	Little blue stem	5%	N/A
<i>Sorghastum nutans</i>	Indian grass	5%	N/A
<i>Tripsicum dactyloides</i>	Gamma grass	5%	N/A

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STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

CONVENTIONAL SYMBOLS

\*S.U.E = SUBSURFACE UTILITY ENGINEER

ROADS & RELATED ITEMS

Edge of Pavement	-----
Curb	-----
Prop. Slope Stakes Cut	----- <sup>C</sup> -----
Prop. Slope Stakes Fill	----- <sup>F</sup> -----
Prop. Woven Wire Fence	○-----○
Prop. Chain Link Fence	□-----□
Prop. Barbed Wire Fence	◇-----◇
Prop. Wheelchair Ramp	○-----○ <small>WCR</small>
Curb Cut for Future Wheelchair Ramp	○-----○ <small>CCFR</small>
Exist. Guardrail	-----
Prop. Guardrail	-----
Equality Symbol	⊕
Pavement Removal	XXXXXX

RIGHT OF WAY

Baseline Control Point	◆
Existing Right of Way Marker	△
Exist. Right of Way Line w/Marker	-----△-----
Prop. Right of Way Line with Proposed R/W Marker (Iron Pin & Cap)	-----▲-----
Prop. Right of Way Line with Proposed (Concrete or Granite) R/W Marker	-----●-----
Exist. Control of Access Line	-----○-----
Prop. Control of Access Line	-----○-----
Exist. Easement Line	-----E-----
Prop. Temp. Construction Easement Line	-----E-----
Prop. Temp. Drainage Easement Line	-----TDE-----
Prop. Perm. Drainage Easement Line	-----PDE-----

HYDROLOGY

Stream or Body of Water	-----
River Basin Buffer	-----RBB-----
Flow Arrow	----->-----
Disappearing Stream	-----
Spring	-----
Swamp Marsh	-----
Shoreline	-----
Falls, Rapids	-----
Prop Lateral, Tail, Head Ditches	-----

STRUCTURES

MAJOR	
Bridge, Tunnel, or Box Culvert	-----CONC-----
Bridge Wing Wall, Head Wall and End Wall	-----CONC HW-----

MINOR	
Head & End Wall	-----CONC HW-----
Pipe Culvert	=====
Footbridge	----->-----
Drainage Boxes	□ CB
Paved Ditch Gutter	-----

UTILITIES

Exist. Pole	•
Exist. Power Pole	•
Prop. Power Pole	•
Exist. Telephone Pole	•
Prop. Telephone Pole	•
Exist. Joint Use Pole	•
Prop. Joint Use Pole	•
Telephone Pedestal	□
U/G Telephone Cable Hand Hold	□
Cable TV Pedestal	□
U/G TV Cable Hand Hold	□
U/G Power Cable Hand Hold	□
Hydrant	•
Satellite Dish	•
Exist. Water Valve	•
Sewer Clean Out	•
Power Manhole	•
Telephone Booth	•
Cellular Telephone Tower	•
Water Manhole	•
Light Pole	•
H-Frame Pole	•
Power Line Tower	•
Pole with Base	•
Gas Valve	•
Gas Meter	•
Telephone Manhole	•
Power Transformer	•
Sanitary Sewer Manhole	•
Storm Sewer Manhole	•
Tank; Water, Gas, Oil	•
Water Tank With Legs	•
Traffic Signal Junction Box	•
Fiber Optic Splice Box	•
Television or Radio Tower	•
Utility Power Line Connects to Traffic Signal Lines Cut Into the Pavement	-----TS-----

Recorded Water Line	-----
Designated Water Line (S.U.E.*)	-----
Sanitary Sewer	-----SS-----
Recorded Sanitary Sewer Force Main	-----FSS-----
Designated Sanitary Sewer Force Main(S.U.E.*)	-----FSS-----
Recorded Gas Line	-----G-----
Designated Gas Line (S.U.E.*)	-----G-----
Storm Sewer	-----S-----
Recorded Power Line	-----P-----
Designated Power Line (S.U.E.*)	-----P-----
Recorded Telephone Cable	-----T-----
Designated Telephone Cable (S.U.E.*)	-----T-----
Recorded U/G Telephone Conduit	-----TC-----
Designated U/G Telephone Conduit (S.U.E.*)	-----TC-----
Unknown Utility (S.U.E.*)	-----TUL-----
Recorded Television Cable	-----TV-----
Designated Television Cable (S.U.E.*)	-----TV-----
Recorded Fiber Optics Cable	-----FO-----
Designated Fiber Optics Cable (S.U.E.*)	-----FO-----
Exist. Water Meter	○
U/G Test Hole (S.U.E.*)	•
Abandoned According to U/G Record	ATTUR
End of Information	E.O.I.

BOUNDARIES & PROPERTIES

State Line	-----
County Line	-----
Township Line	-----
City Line	-----
Reservation Line	-----
Property Line	-----
Property Line Symbol	-----
Exist. Iron Pin	•
Property Corner	•
Property Monument	•
Property Number	123
Parcel Number	6
Fence Line	-----X-----
Existing Wetland Boundaries	-----WW & ISBW-----
High Quality Wetland Boundary	-----HQ WLB-----
Medium Quality Wetland Boundaries	-----MO WLB-----
Low Quality Wetland Boundaries	-----LO WLB-----
Proposed Wetland Boundaries	-----WLB-----
Existing Endangered Animal Boundaries	-----EAB-----
Existing Endangered Plant Boundaries	-----EPB-----

BUILDINGS & OTHER CULTURE

Buildings	-----
Foundations	-----
Area Outline	-----
Gate	-----
Gas Pump Vent or U/G Tank Cap	-----
Church	-----
School	-----
Park	-----
Cemetery	-----
Dam	-----
Sign	-----
Well	-----
Small Mine	-----
Swimming Pool	-----

TOPOGRAPHY

Loose Surface	-----
Hard Surface	-----
Change in Road Surface	-----
Curb	-----
Right of Way Symbol	R/W
Guard Post	○ GP
Paved Walk	-----
Bridge	-----
Box Culvert or Tunnel	-----
Ferry	-----
Culvert	-----
Footbridge	-----
Trail, Footpath	-----
Light House	-----

VEGETATION




Single Tree	-----
Single Shrub	-----
Hedge	-----
Woods Line	-----
Orchard	-----
Vineyard	-----

RAILROADS

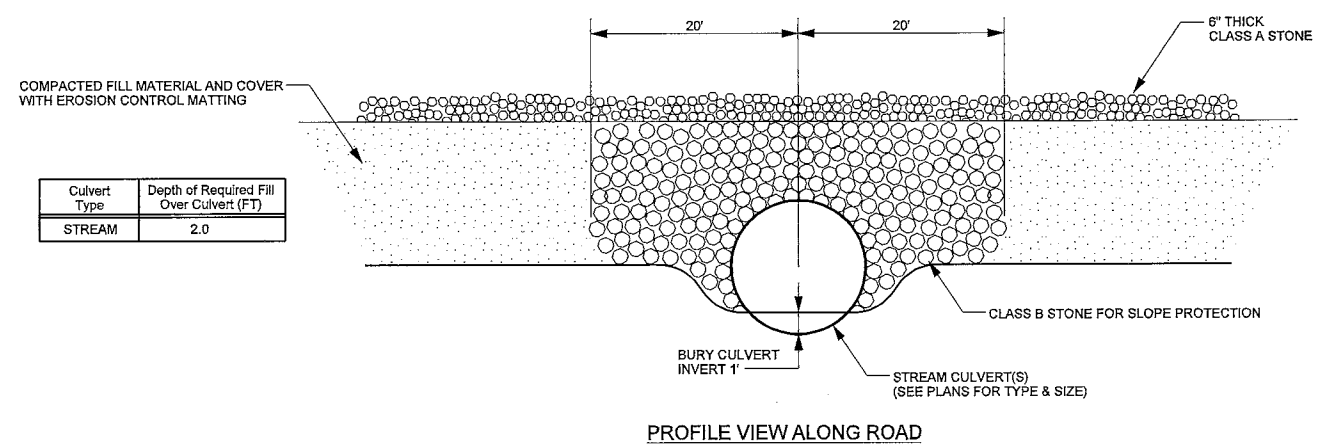
Standard Gauge	-----
RR Signal Milepost	-----
Switch	-----

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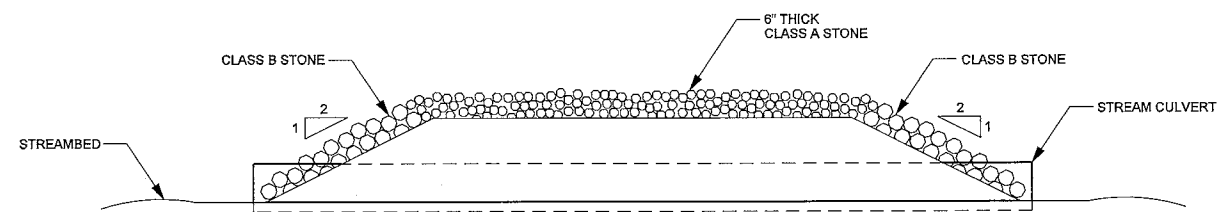
PROJECT REFERENCE NO. <b>113115</b>	SHEET NO. <b>2</b>
PROJECT ENGINEER	
	 APPROVED BY: <b>10-20-09</b> DATE:
	
Michael Baker Engineering Inc. 8000 Regency Parkway Suite 200 Cary, NORTH CAROLINA 27518 Phone: 919.463.5488 Fax: 919.463.5490	

**PERMANENT ROAD CULVERT CROSSING**



Culvert Type	Depth of Required Fill Over Culvert (FT)
STREAM	2.0

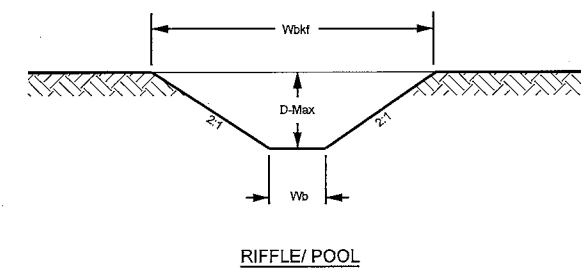
PROFILE VIEW ALONG ROAD



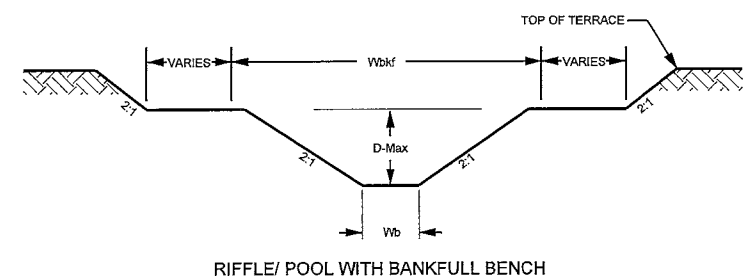
CROSS SECTION

- NOTES:**
1. APPLY SUFFICIENT FILL OVER CULVERTS TO PREVENT CULVERT COLLAPSE.
  2. PLACE CLASS B STONE ON SIDE SLOPES OF ROAD FILL WITH 20' OF COVER. STABILIZE REMAINING ROAD SIDE SLOPES WITH EROSION MATTING ACCORDING TO SPECIFICATIONS.

**TYPICAL RIFFLE, POOL, AND BANKFULL BENCH CROSS SECTIONS - REACH UT4**



RIFFLE/ POOL



RIFFLE/ POOL WITH BANKFULL BENCH

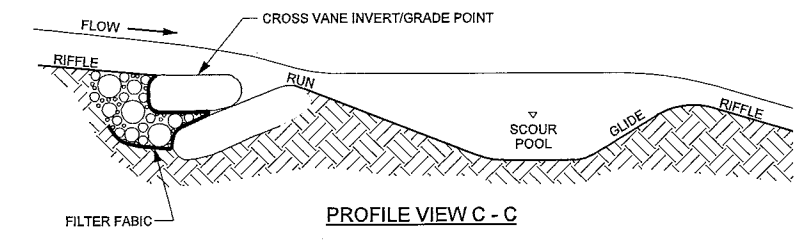
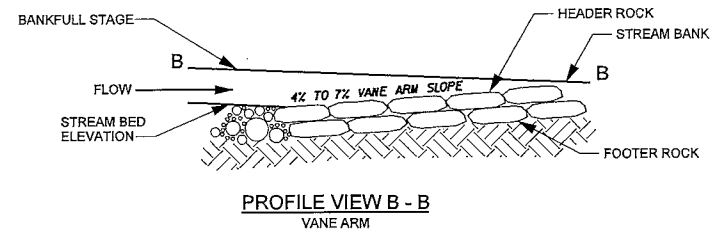
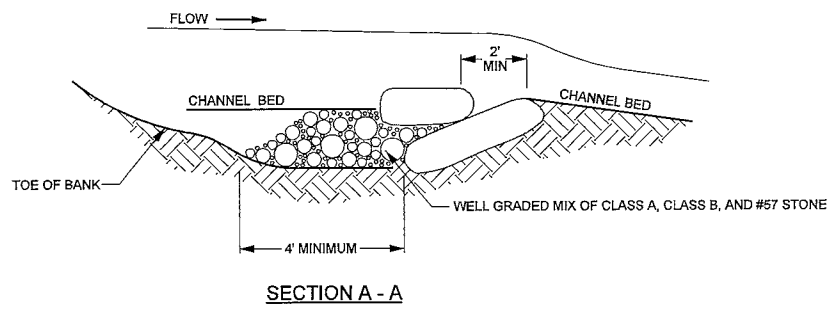
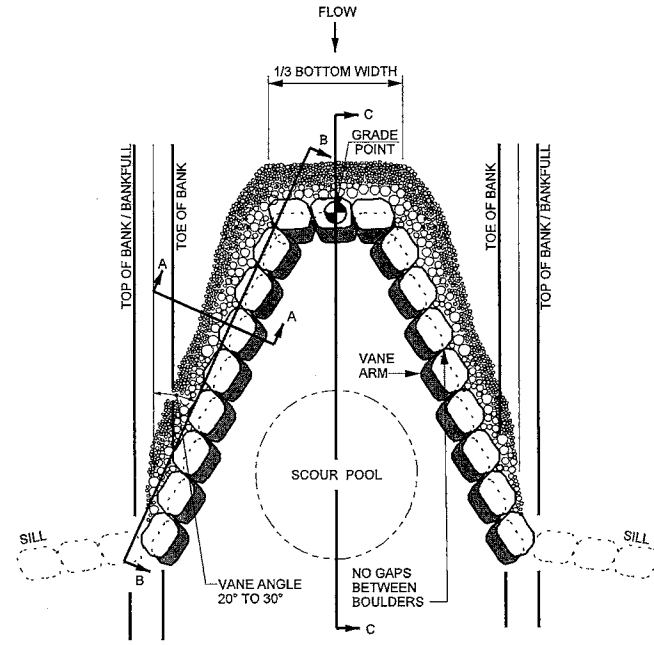
UT4		
RIFFLE	POOL	
8.5	9.0	WIDTH OF BANKFULL (Wbkf)
0.8	2.0	MAXIMUM DEPTH (D-Max)
12.0	10.0	WIDTH TO DEPTH RATIO (Wbkf / D)
3.5	7.0	BANKFULL AREA (Abkf)
3.0	2.0	BOTTOM WIDTH (Wb)

- NOTES:**
1. DURING CONSTRUCTION CORNERS OF DESIGN CHANNEL WILL BE ROUNDED AND A THALWEG WILL BE SHAPED PER DIRECTION OF ENGINEER.

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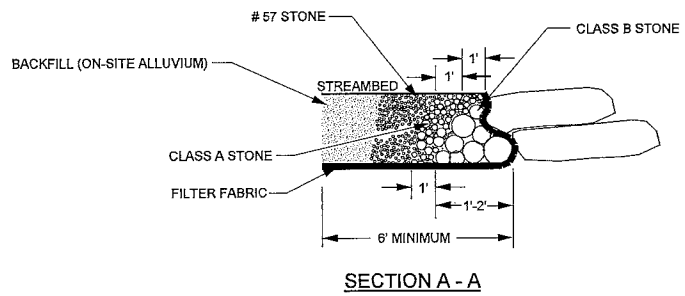
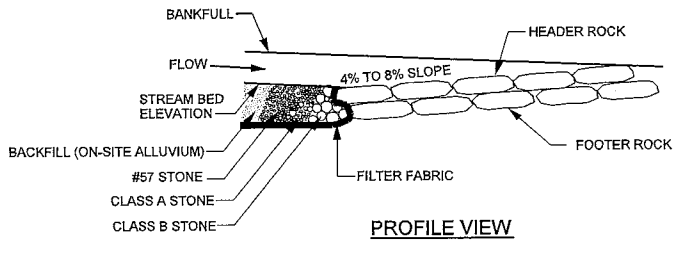
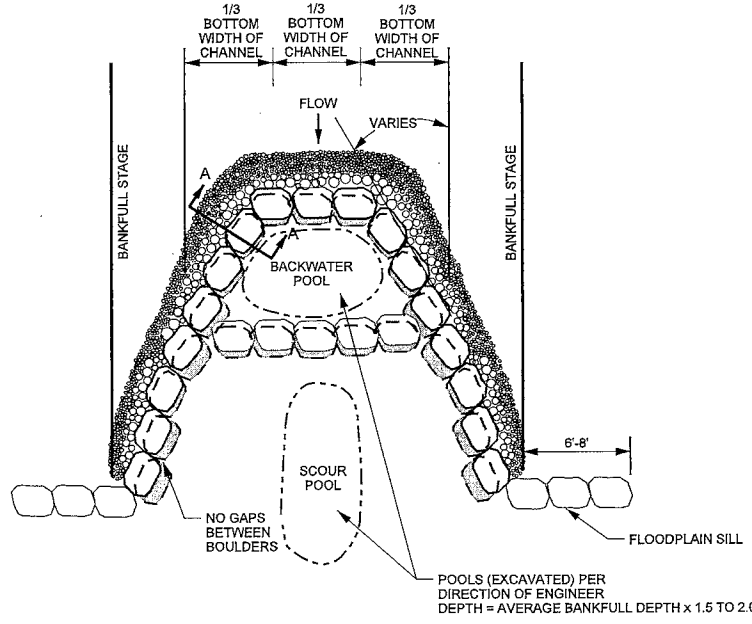
**ROCK CROSS VANE**



- NOTES FOR ALL VANE STRUCTURES:**
1. BOULDERS MUST BE AT LEAST 4' x 3' x 2'.
  2. INSTALL FILTER FABRIC FOR DRAINAGE BEGINNING AT THE MIDDLE OF THE HEADER ROCKS AND EXTEND DOWNWARD TO THE DEPTH OF THE BOTTOM FOOTER ROCK, AND THEN UPSTREAM TO A MINIMUM OF SIX FEET.
  3. DIG A TRENCH BELOW THE BED FOR FOOTER ROCKS AND PLACE FILL ON UPSTREAM SIDE OF VANE ARM, BETWEEN THE ARM AND STREAMBANK.
  4. CONSTRUCT FOLLOWING ANGLE AND SLOPE SPECIFICATIONS.
  5. USE CLASS B STONE TO FILL GAPS ON UPSTREAM SIDE OF BOULDERS, CLASS A, AND #57 STONE TO FILL GAPS ON UPSTREAM SIDE OF CLASS B STONE.
  6. AFTER ALL STONE HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH ON-SITE ALLUVIUM TO THE ELEVATION OF ONE HALF THE HEADER ROCK.

PROJECT REFERENCE NO. <b>113115</b>	SHEET NO. <b>2-A</b>
PROJECT ENGINEER	
	APPROVED BY: 
	DATE: <b>10-20-09</b>
Michael Baker Engineering Inc. 8000 Regency Parkway Suite 200 Cary, NORTH CAROLINA 27518 Phone: 919.463.5488 Fax: 919.463.5490	

**DOUBLE DROP ROCK CROSS VANE**

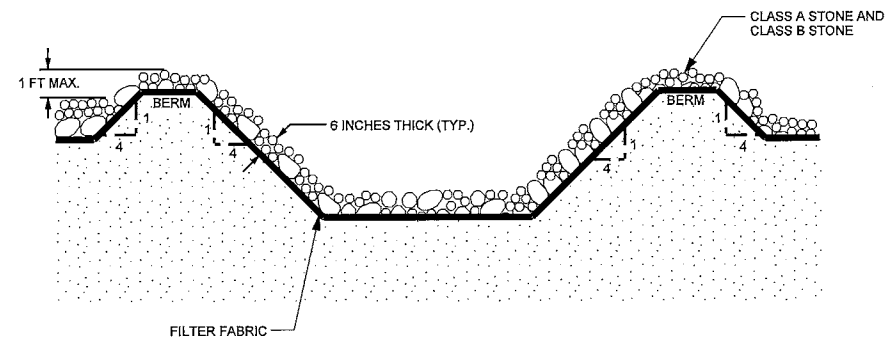


- NOTES FOR ALL VANE STRUCTURES:**
1. BOULDERS MUST BE AT LEAST 4' x 3' x 2'.
  2. INSTALL FILTER FABRIC FOR DRAINAGE BEGINNING AT THE MIDDLE OF THE HEADER ROCKS AND EXTEND DOWNWARD TO THE DEPTH OF THE BOTTOM FOOTER ROCK, AND THEN UPSTREAM TO A MINIMUM OF TEN FEET.
  3. DIG A TRENCH BELOW THE BED FOR FOOTER ROCKS AND PLACE FILL ON UPSTREAM SIDE OF VANE ARM, BETWEEN THE ARM AND STREAM BANK.
  4. START AT BANKFULL AND PLACE FOOTER ROCKS FIRST AND THEN HEADER (TOP) ROCK.
  5. CONTINUE WITH STRUCTURE, FOLLOWING ANGLE AND SLOPE SPECIFICATIONS.
  6. AN EXTRA BOULDER CAN BE PLACED IN SCOUR POOL FOR HABITAT IMPROVEMENT.
  7. USE CLASS B STONE TO FILL GAPS ON UPSTREAM SIDE OF BOULDERS, CLASS A, AND #57 STONE TO FILL GAPS ON UPSTREAM SIDE OF CLASS B STONE.
  8. AFTER ALL STONE HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH ON-SITE ALLUVIUM TO THE ELEVATION OF THE TOP OF THE HEADER ROCK.

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2/26/03

### PERMANENT FORD STREAM CROSSING



#### NOTES:

1. CONSTRUCT STREAM CROSSING WHEN FLOW IS LOW.
2. HAVE ALL NECESSARY MATERIALS AND EQUIPMENT ON-SITE BEFORE WORK BEGINS.
3. MINIMIZE CLEARING AND EXCAVATION OF STREAMBANKS. DO NOT EXCAVATE CHANNEL BOTTOM. COMPLETE ONE SIDE BEFORE STARTING ON THE OTHER SIDE.
4. INSTALL STREAM CROSSING AT RIGHT ANGLE TO THE FLOW.
5. GRADE SLOPES ACCORDING TO DETAIL. TRANSPLANT SOD FROM ORIGINAL STREAMBANK ONTO SIDE SLOPES IF AVAILABLE.
6. MAINTAIN CROSSING SO THAT RUNOFF IN THE CONSTRUCTION ROAD DOES NOT ENTER EXISTING CHANNEL.
7. A STABILIZED PAD OF CLASS A AND CLASS B STONE, 1 FOOT THICK, LINED WITH FILTER FABRIC FOR DRAINAGE SHALL BE USED OVER THE BERM AND ACCESS SLOPES.
8. WIDTH OF THE CROSSING SHALL BE SUFFICIENT TO ACCOMMODATE THE LARGEST VEHICLE CROSSING THE CHANNEL.
9. CONTRACTOR SHALL DETERMINE AN APPROPRIATE RAMP ANGLE ACCORDING TO EQUIPMENT UTILIZED.

PROJECT REFERENCE NO. SHEET NO.

113115

2-B

PROJECT ENGINEER



APPROVED BY:

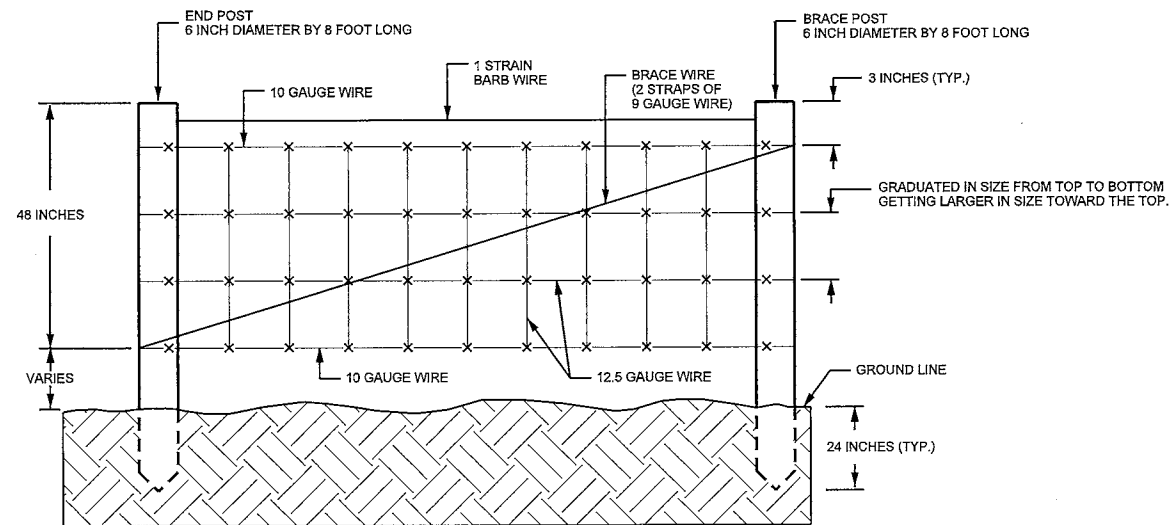
10-20-09

DATE:

## Baker

Michael Baker Engineering Inc.  
 8000 Regency Parkway  
 Suite 200  
 Cary, NORTH CAROLINA 27518  
 Phone: 919.463.5498  
 Fax: 919.463.5490

### WOVEN FIELD FENCE



- NOTE:
1. END POSTS SHALL BE INSTALLED AT A SPACING OF 10-15 FEET.

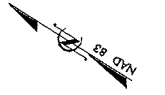
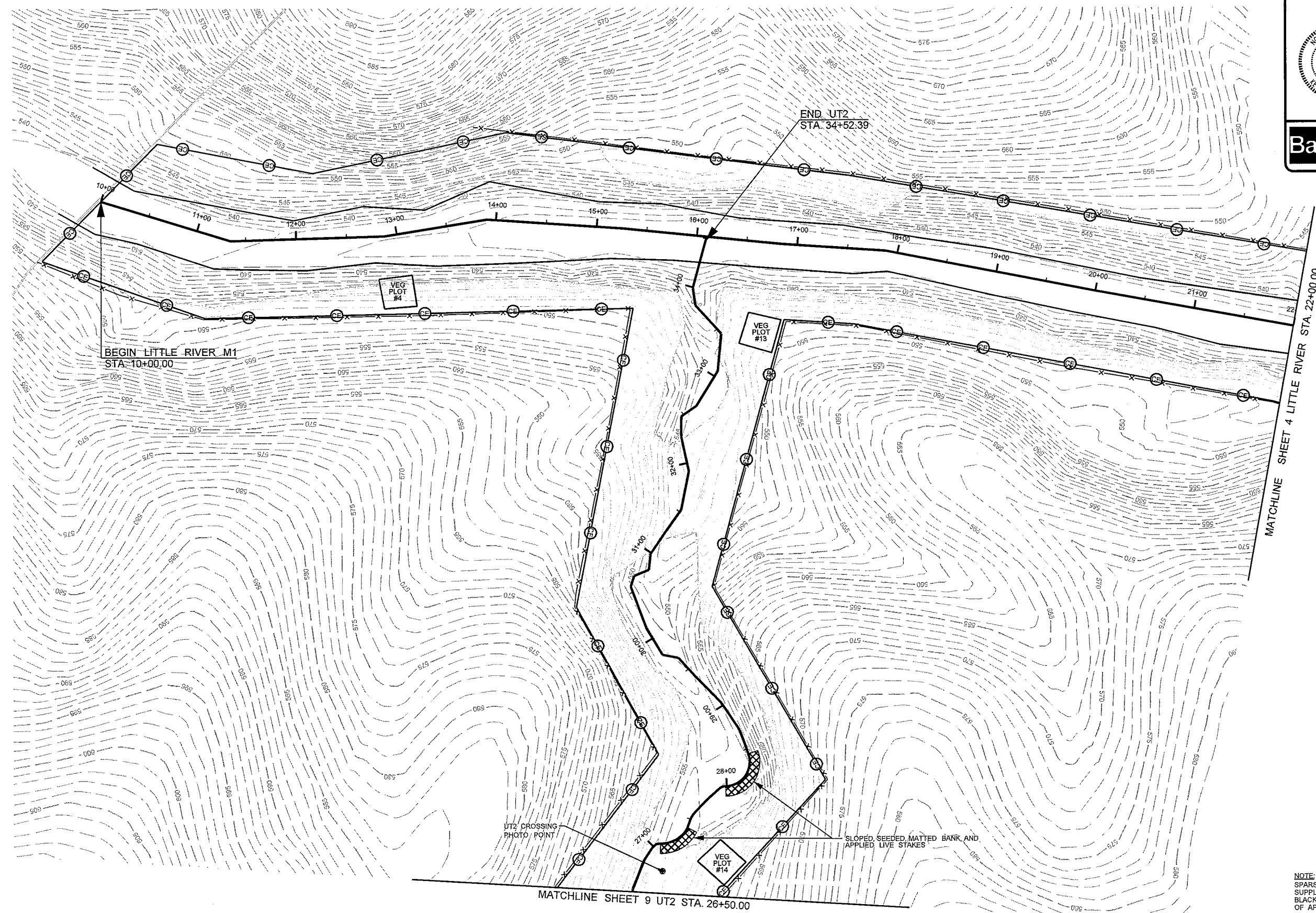
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DATE: 10-20-09

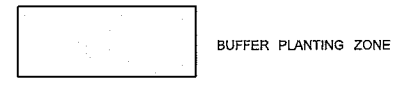
**Baker**

Michael Baker Engineering Inc.  
8000 Regency Parkway  
Suite 200  
Cary, NORTH CAROLINA 27518  
Phone: 919.483.5488  
Fax: 919.483.5490



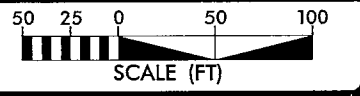
MATCHLINE SHEET 4 LITTLE RIVER STA. 22+00.00

MATCHLINE SHEET 9 UT2 STA. 26+50.00



NOTE:  
SPARSE AREAS OF EXISTING TREES WERE SUPPLEMENTALLY PLANTED NORTH OF BLACK ANKLE ROAD TO REACH A DENSITY OF APPROXIMATELY 320 TREES PER ACRES.

**LITTLE RIVER FARM  
PLAN VIEW**



2/26/03  
10/20/2009  
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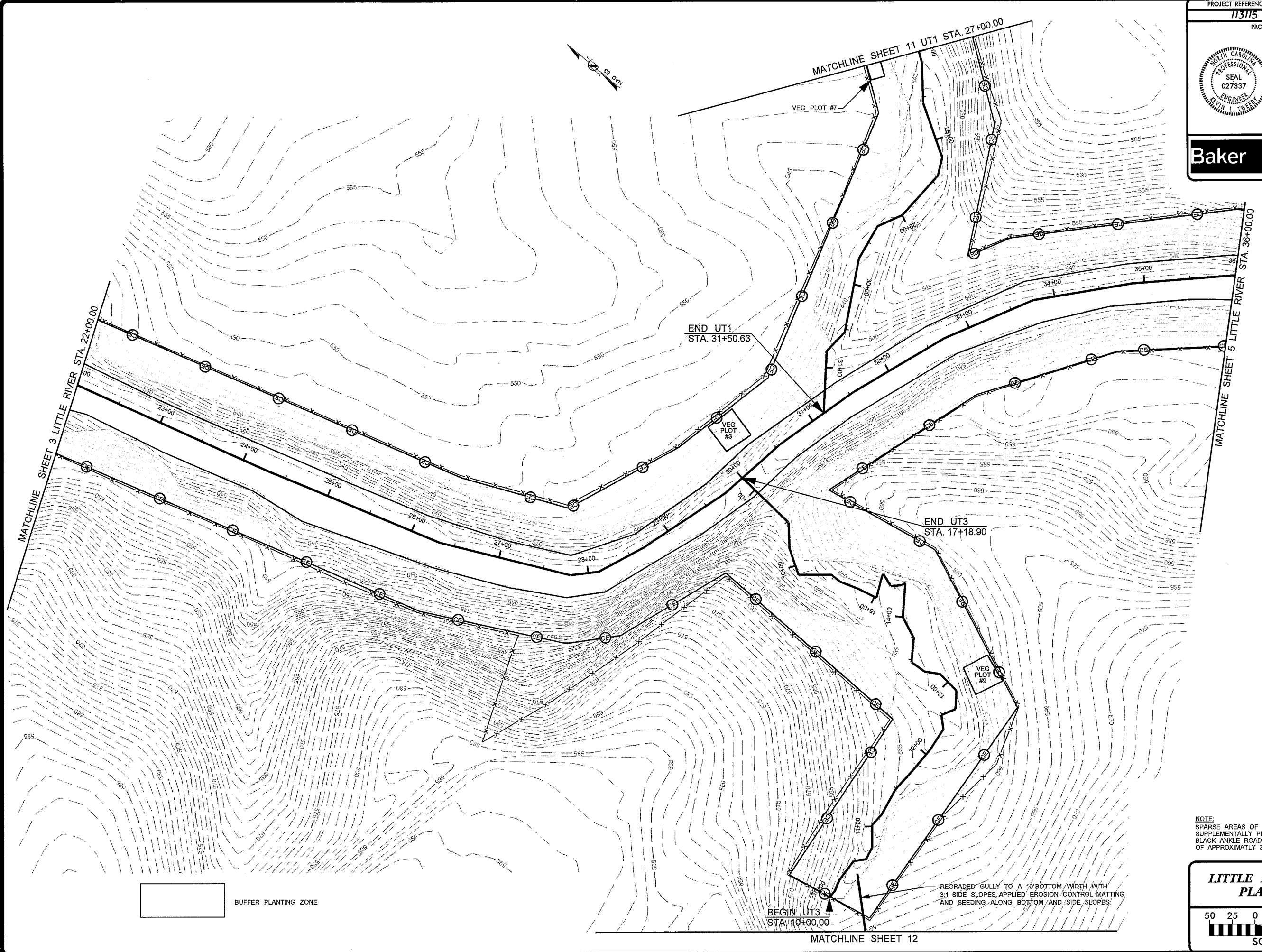


PROJECT ENGINEER



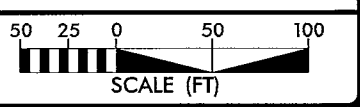
APPROVED BY:  
  
 DATE:  
 10-20-09

**Baker**  
 Michael Baker Engineering Inc.  
 6200 Regency Parkway  
 Suite 200  
 Cary, NORTH CAROLINA 27518  
 Phone: 919.483.5499  
 Fax: 919.483.5490



NOTE:  
 SPARSE AREAS OF EXISTING TREES WERE SUPPLEMENTALLY PLANTED NORTH OF BLACK ANGLE ROAD TO REACH A DENSITY OF APPROXIMATELY 320 TREES PER ACRES.

**LITTLE RIVER FARM  
 PLAN VIEW**



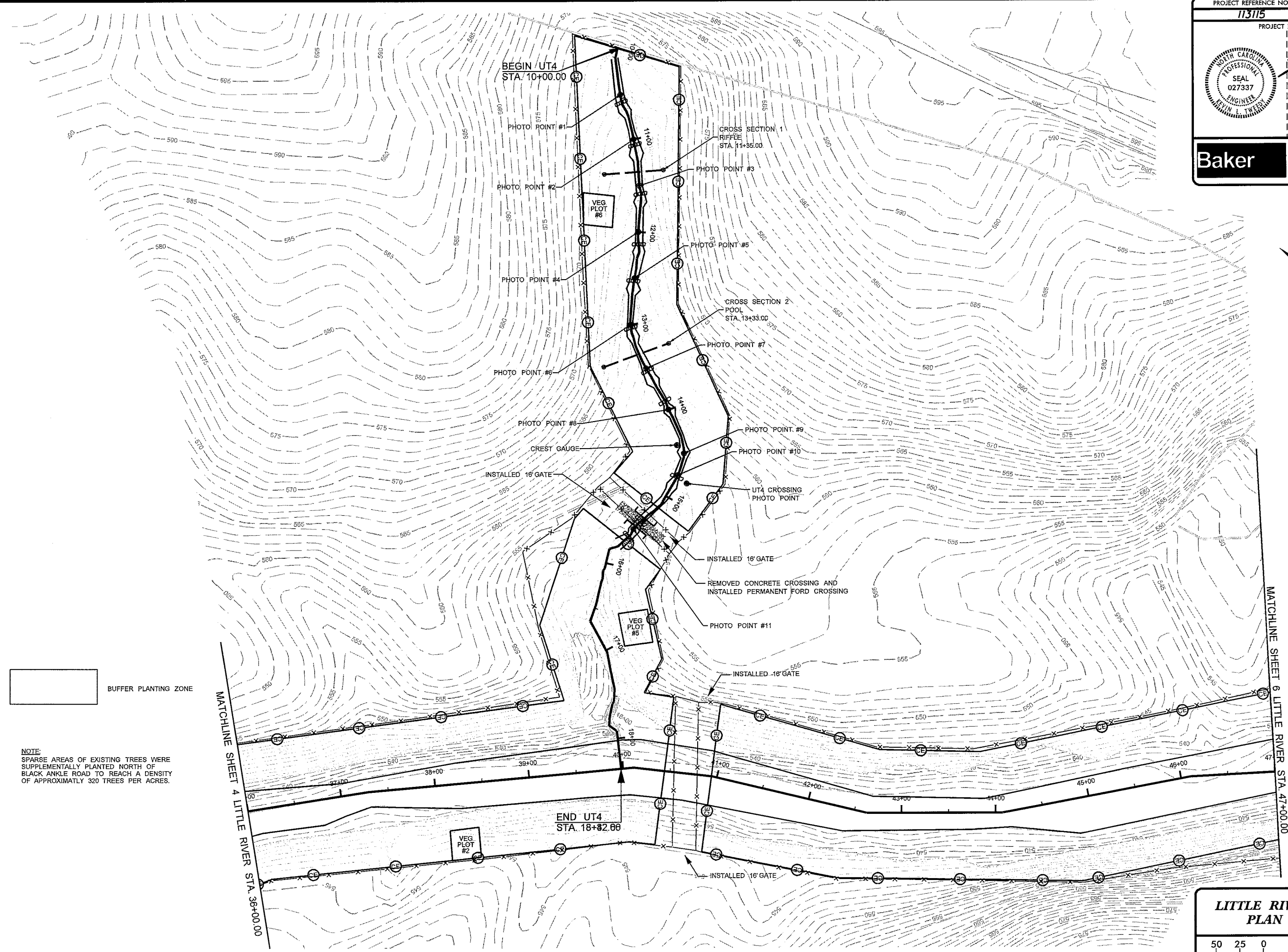
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APPROVED BY: [Signature]  
DATE: 10-20-09

**Baker**

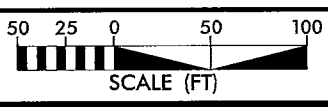
Michael Baker Engineering Inc.  
6000 Regency Parkway  
Suite 200  
Cary, NORTH CAROLINA 27518  
Phone: 919.483.5483  
Fax: 919.483.5490



BUFFER PLANTING ZONE

NOTE:  
SPARSE AREAS OF EXISTING TREES WERE SUPPLEMENTALLY PLANTED NORTH OF BLACK ANKLE ROAD TO REACH A DENSITY OF APPROXIMATELY 320 TREES PER ACRES.

**LITTLE RIVER FARM  
PLAN VIEW**



2/26/03

10/29/2009  
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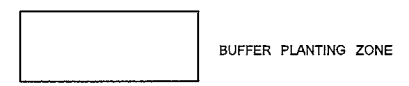
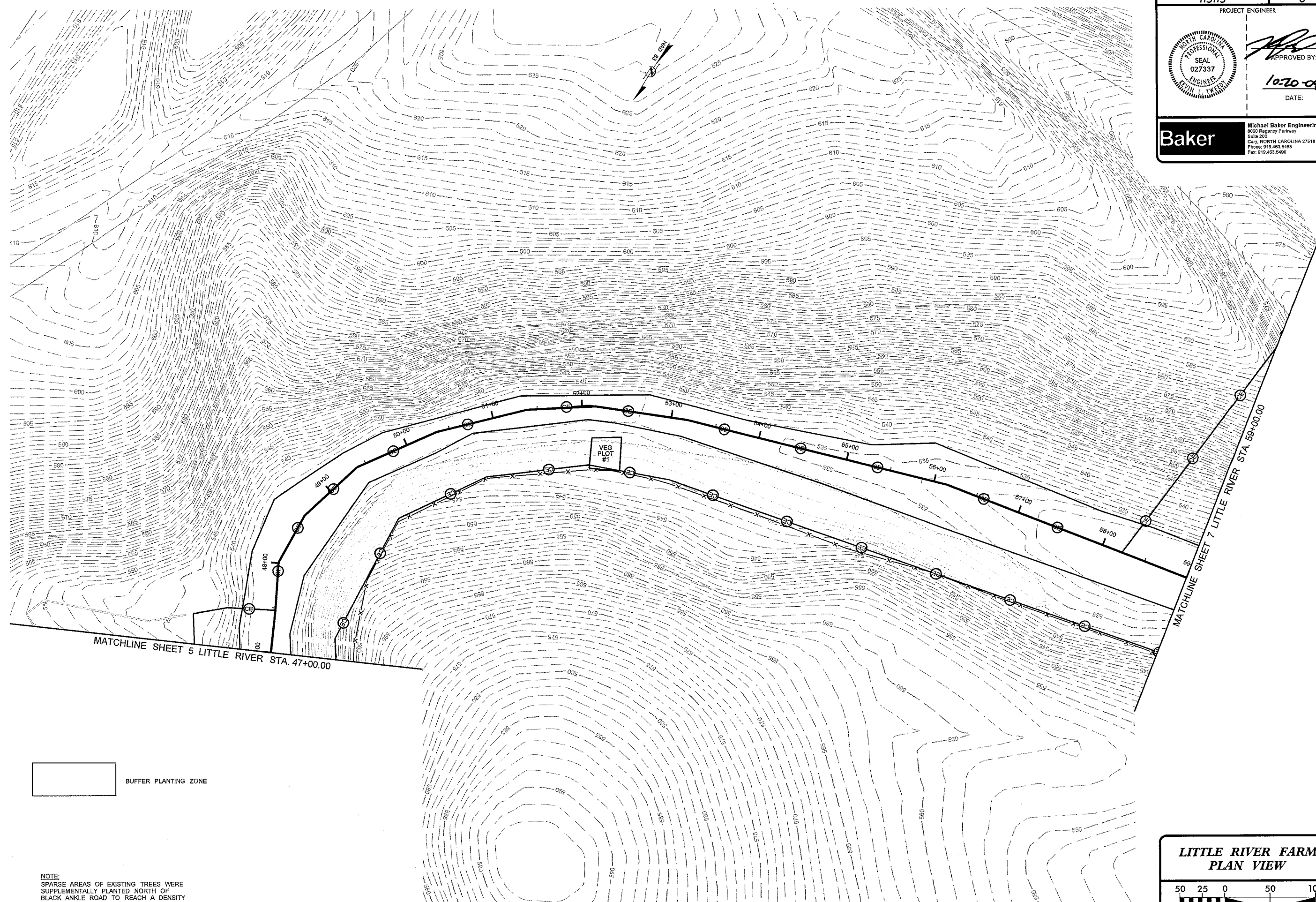
PROJECT ENGINEER

APPROVED BY: *[Signature]*

DATE: 10-20-09

**Baker**

Michael Baker Engineering Inc.  
 6000 Regency Parkway  
 Suite 200  
 Cary, NORTH CAROLINA 27518  
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 Fax: 919.463.5480

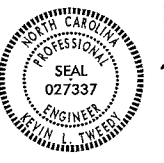


**NOTE:**  
 SPARSE AREAS OF EXISTING TREES WERE SUPPLEMENTALLY PLANTED NORTH OF BLACK ANKLE ROAD TO REACH A DENSITY OF APPROXIMATELY 320 TREES PER ACRES.

**LITTLE RIVER FARM  
 PLAN VIEW**

SCALE (FT)

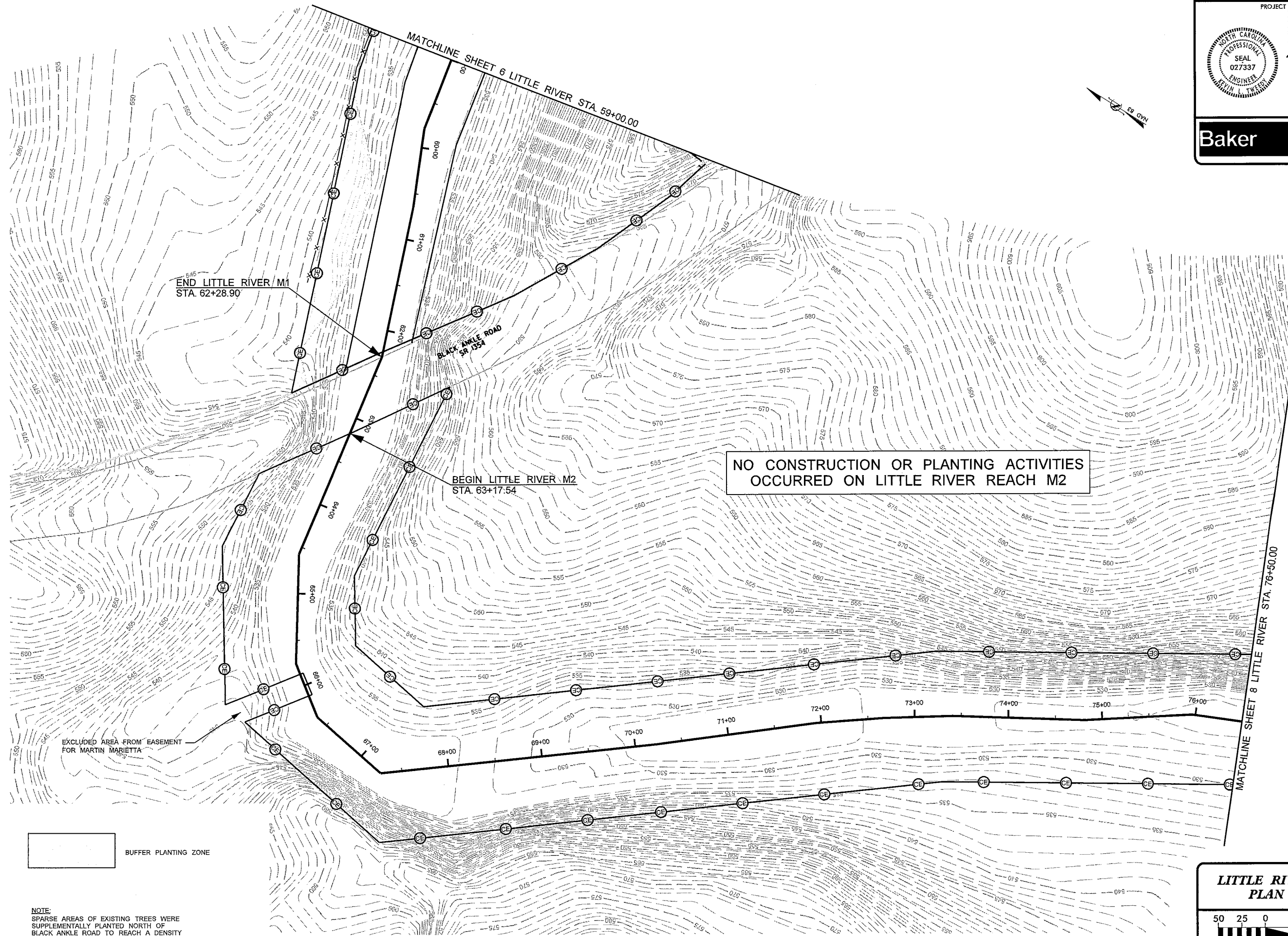
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APPROVED BY: [Signature]  
DATE: 10-20-09

**Baker**

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Fax: 919.463.5490



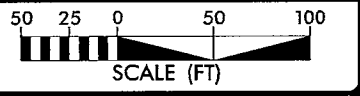
NO CONSTRUCTION OR PLANTING ACTIVITIES OCCURRED ON LITTLE RIVER REACH M2

EXCLUDED AREA FROM EASEMENT FOR MARTIN MARIETTA

NOTE:  
SPARSE AREAS OF EXISTING TREES WERE SUPPLEMENTALLY PLANTED NORTH OF BLACK ANKLE ROAD TO REACH A DENSITY OF APPROXIMATELY 320 TREES PER ACRES.


BUFFER PLANTING ZONE

**LITTLE RIVER FARM  
PLAN VIEW**



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10/29/2009  
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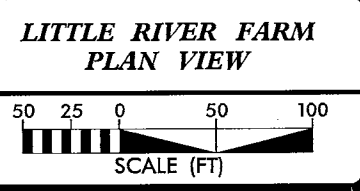
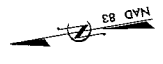
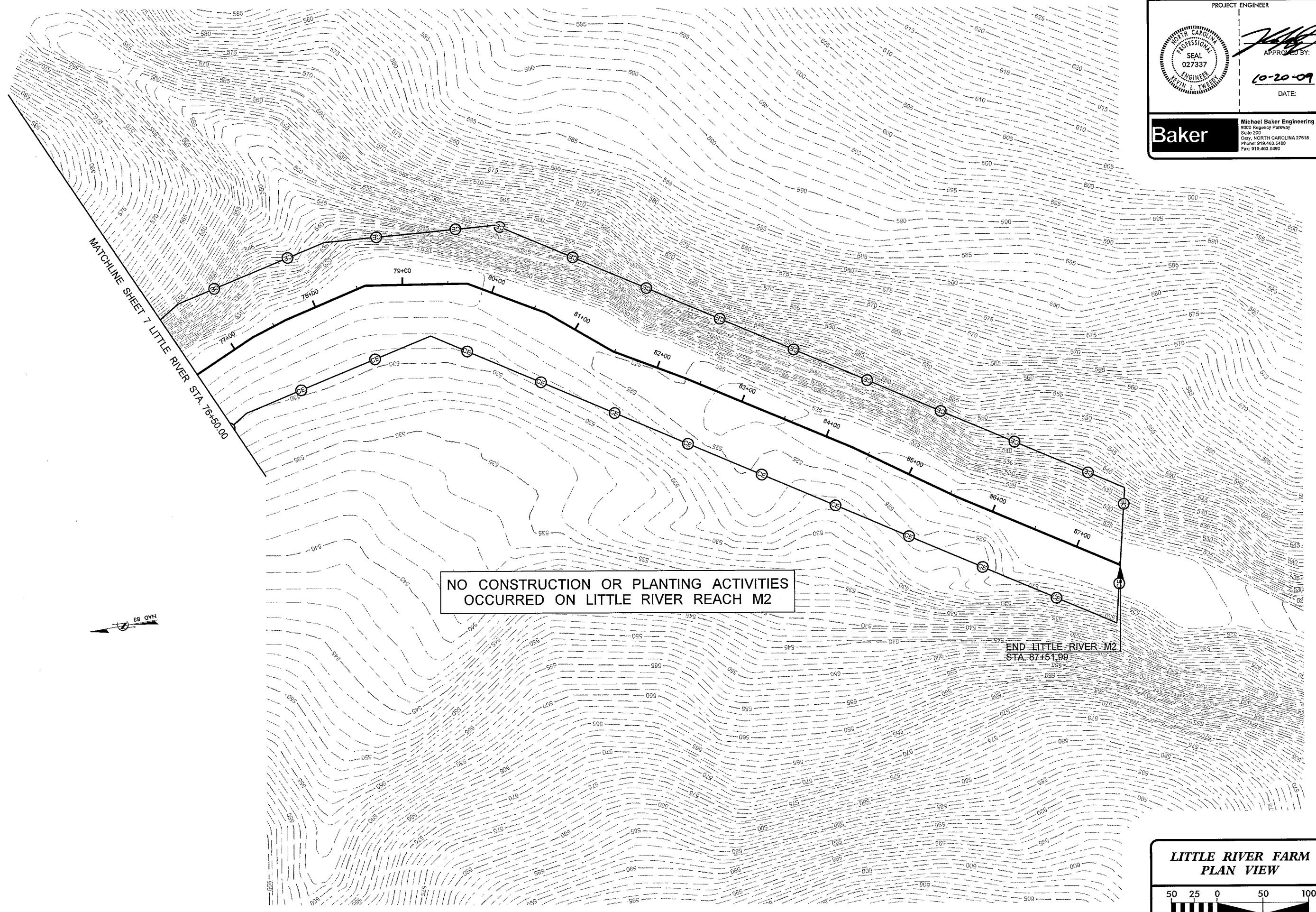
PROJECT ENGINEER

APPROVED BY: 

DATE: 10-20-09

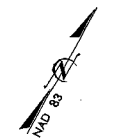
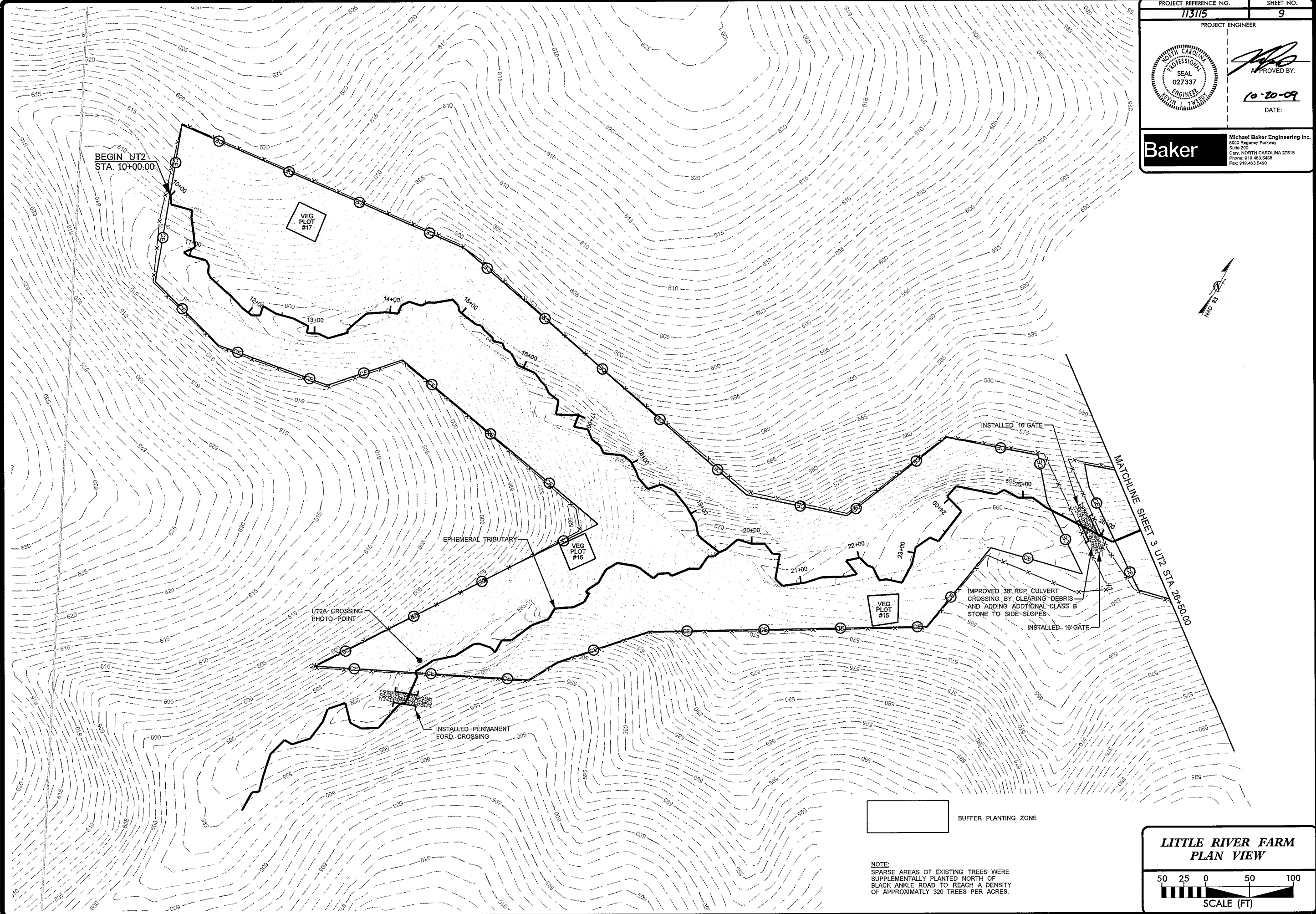
**Baker**

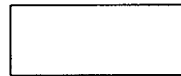
Michael Baker Engineering Inc.  
 8000 Regency Parkway  
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 Cary, NORTH CAROLINA 27518  
 Phone: 919.463.5488  
 Fax: 919.463.5490



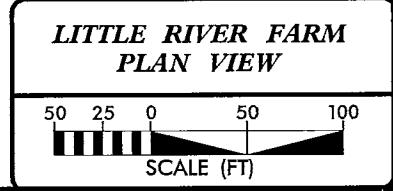
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2/25/03  
10/20/2009  
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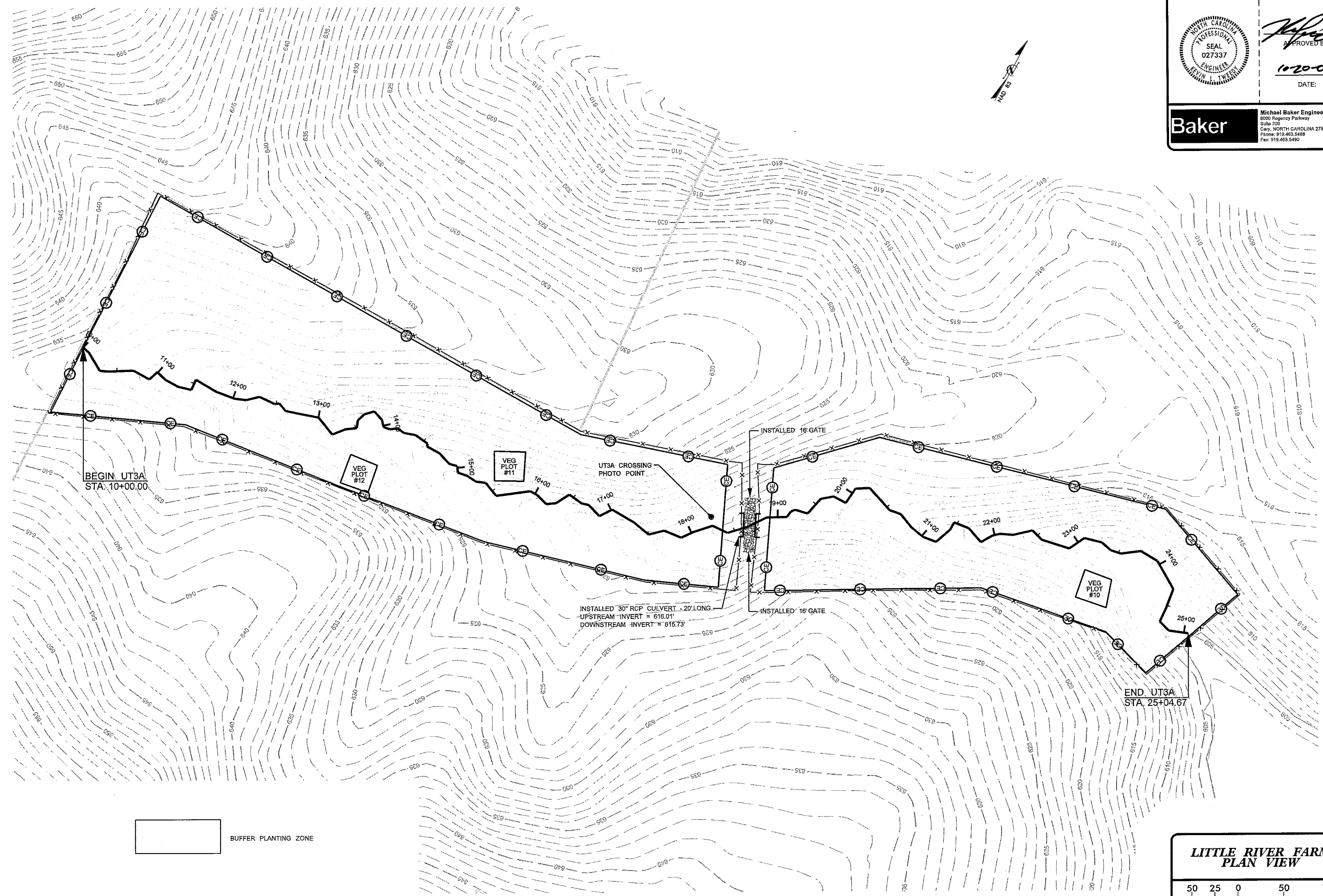



 BUFFER PLANTING ZONE

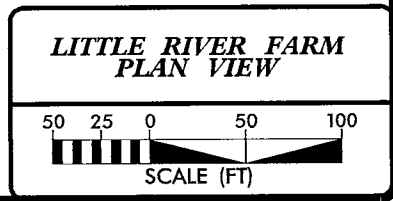
**NOTE:**  
SPARSE AREAS OF EXISTING TREES WERE SUPPLEMENTALLY PLANTED NORTH OF BLACK ANKLE ROAD TO REACH A DENSITY OF APPROXIMATELY 320 TREES PER ACRES.






PROJECT REFERENCE NO. <b>113115</b>	SHEET NO. <b>10</b>
PROJECT ENGINEER	
	
APPROVED BY: <i>[Signature]</i>	
DATE: <b>10/20/09</b>	
	
<small>Michael Baker Engineering Inc. 6000 Regency Parkway Suite 200 Cary, NORTH CAROLINA 27518 Phone: 919.463.5488 Fax: 919.463.5490</small>	

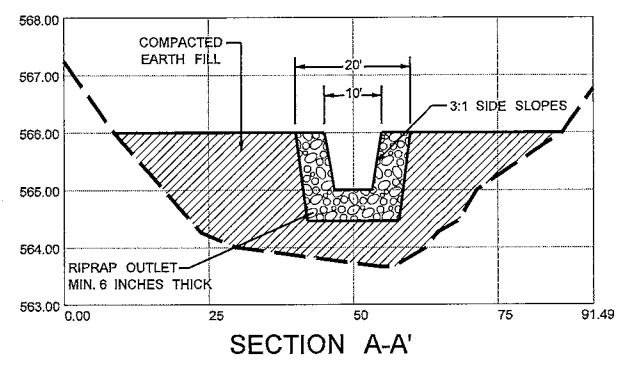
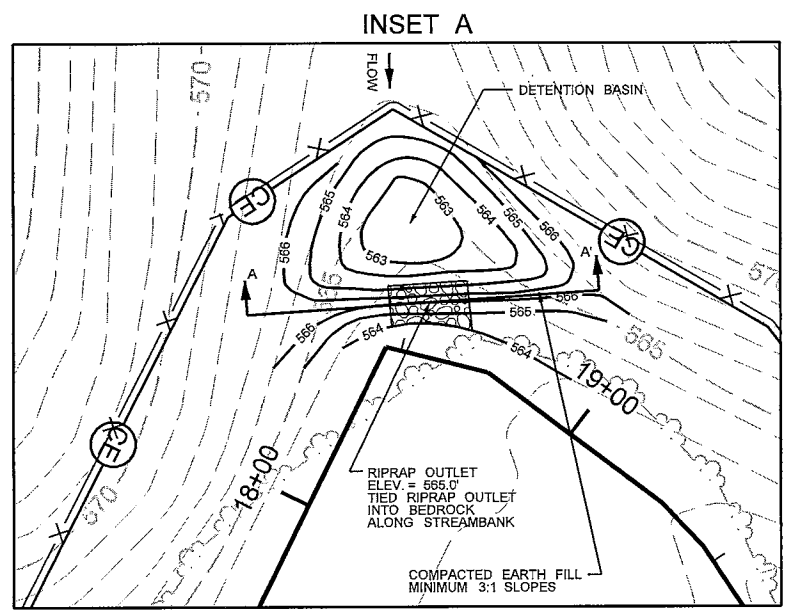
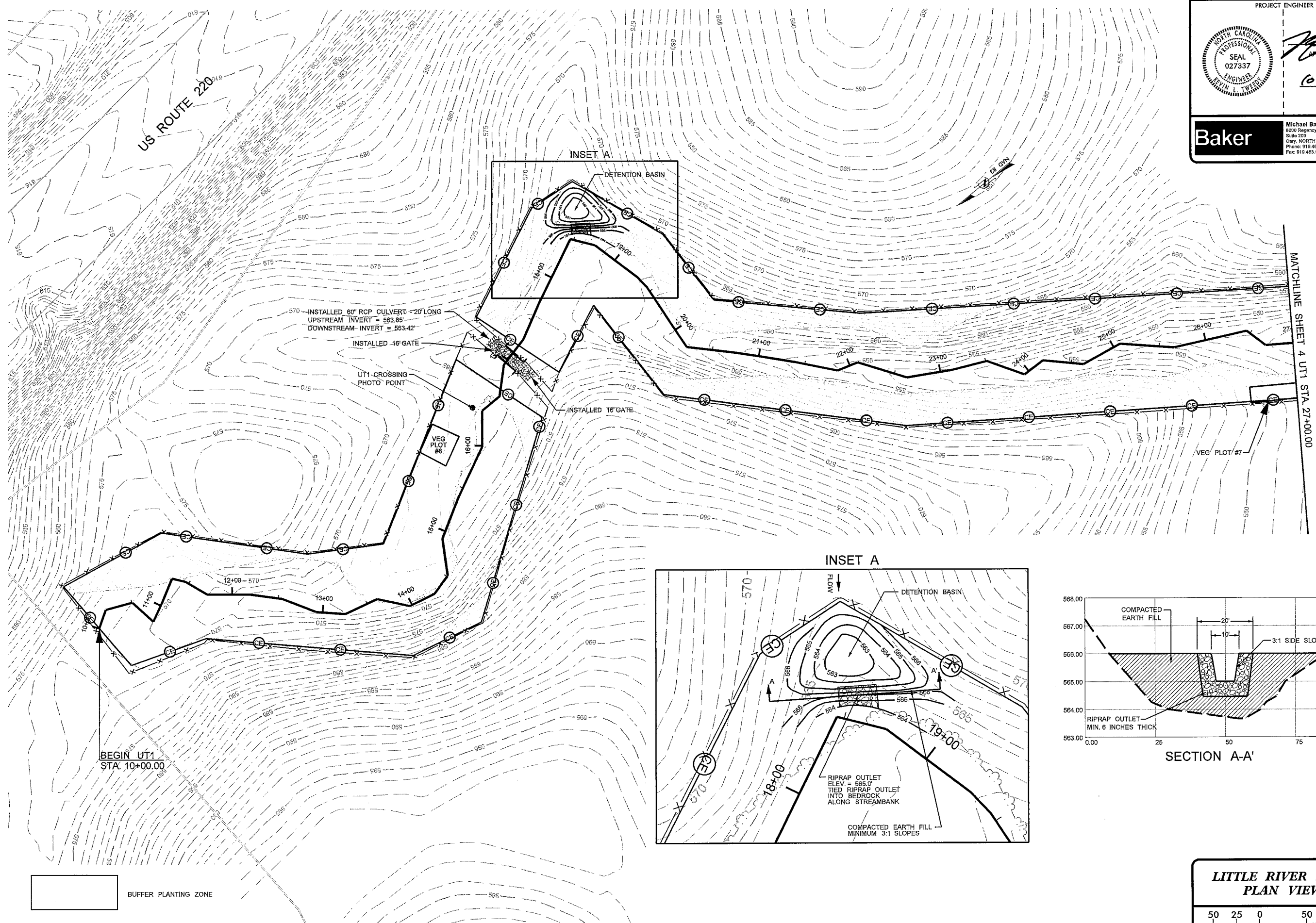


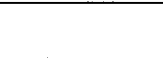
 BUFFER PLANTING ZONE



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PROJECT REFERENCE NO. <b>113115</b>	SHEET NO. <b>11</b>
PROJECT ENGINEER	
	
APPROVED BY: 	
DATE: <b>10-20-09</b>	
	
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 BUFFER PLANTING ZONE

**LITTLE RIVER FARM  
PLAN VIEW**

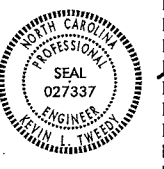


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PROJECT REFERENCE NO. <b>113115</b>	SHEET NO. <b>12</b>
PROJECT ENGINEER	
	APPROVED BY:  <b>10-20-09</b> DATE:
	
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MATCHLINE SHEET 4



10/20/2009  
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**APPENDIX E:  
PHOTO LOG**

## **UT4 PID Photos**



**UT4 - PID 1**



**UT4 - PID 2**



**UT4 - PID 3**



**UT4 - PID 4**



**UT4 - PID 5**



**UT4 - PID 6**



**UT4 – PID 7**



**UT4 – PID 8**



**UT4 – PID 9**



**UT4 – PID 10**



**UT4 – PID 11**

# **CROSSING PHOTOS**



**UT1 Crossing PID – Station 17+00**



**UT2 Crossing PID – Station 25+50**



**UT2A Crossing PID – Station 00+00**



**UT3A Crossing PID – Station 18+50**



**UT4 Crossing PID – Station 15+25**

# **Crest Gauge Photos**





**UT4 Crest Gauge – 12/9/2011**