Little River Farm Site – Stream Enhancement, Restoration, and Preservation Project

Final Year 3 Monitoring Report (2012)

Montgomery County, North Carolina

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Final Year 3 Monitoring Report (2012)

Montgomery County, North Carolina

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1.0 EXECUTIVE SUMMARY

This Annual Report details the monitoring activities during the 2012 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, two permanent cross-sections, 515 linear feet (LF) of longitudinal profile, and one crest gauge were installed and assessed across the site. The 2012 data represents results from the third 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 communities within the site consist of a combination of pasture and wooded areas comprised of typical representative species. 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 26.4 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 survival 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 survival range of 202 stems per acre to 647 stems per acre with an overall average of 447 stems per acre. Though the overall average stem count per acre has met the Year 3 Monitoring success criteria of 320 stems per acre, additional floodplain plantings will be implemented in 2013 to ensure that project will meet the final success criteria of 260 stems per acre in Year 5.

In general, the majority of the project's dimension, pattern, profile and in-stream structures remained stable during the third growing season. Areas of concern on UT4 will be addressed through maintenance activities during 2013 and may include bioengineering measures such as the installation of brush mattresses, geo-lifts, and live stakes. One bankfull event was documented during 2012.

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.

Approximately 26.4 AC of associated riparian buffer were restored/enhanced throughout the site, while a conservation easement consisting of 44.5 AC will protect all stream reaches and riparian buffers in perpetuity.

For analysis purposes, Baker divided Little River, UT1, UT2 UT3, and UT4 into seven reaches (As-built Plan Sheets, Appendix D). 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 exceeded 1.2 and most channels appeared 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 drained the upper section of UT3. At the completion of construction of the full delivery project in 2010, 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 the Year 2 Monitoring Report, the lagoons had been removed, construction was completed, and a conservation easement has been established on the restored section of stream which connects 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 where mature tree canopy did not already exist. Watering tanks fed by well water are located in several of the pastures, and additional watering tanks were installed as part of this project to ensure the cattle have adequate access to drinking water.

Four improved stream crossings were installed as part of the project. A culvert crossing was installed on UT1, UT2, and UT3A to provide cattle and farm machinery access to adjacent pastureland without further damaging the stream channels. The existing ford crossing on UT4 was improved as part of this project.

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. Buffer planting along UT4 was completed during January 2010. 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

Project Segment or Reach ID	Restoration Plan Feet/Acres*	Mitigation Type	Approach	As-built Linear Footage or Acreage*	Mitigation Ratio	Mitigation Units	Stationing	Comment
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.

Table 1. Project Mitigation Approach

Little River Farm Site: Project No. 000623

Project Segment or Reach ID	Restoration Plan Feet/Acres*	Mitigation Type	Approach	As-built Linear Footage or Acreage*	Mitigation Ratio	Mitigation Units	Stationing	Comment
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.
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 conser-vation easement by fencing. The exisiting 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

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

*Value indicates total acreage within the established easement included as part of this project only.

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.

Table 2. Project Activity and Reporting History			
Little River Farm Site: Project No. 000623			
Activity or Report	**Scheduled Completion**	**Data Collection Complete**	**Actual Completion or Delivery**
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	Dec-11	Mar-12
Year 3 Monitoring	Dec-12	Sept-12	Mar-13
Year 4 Monitoring	Scheduled Dec-13	Scheduled Nov-13	N/A
Year 5 Monitoring	Scheduled Dec-14	Scheduled Nov-14	N/A

Table 3. Project Contacts	
Little River Farm Site: Project No. 000623	
Designer	
Michael Baker Engineering, Inc.	8000 Regency Parkway, Suite 600 Cary, NC 27518 Contact: Kevin Tweedy, Tel. 919-463-5488
Construction Contractor	
River Works, Inc.	6105 Chapel Hill Road Raleigh, NC 27607 Contact: Phillip Todd, Tel. 919-582-3575
Planting Contractor	
River Works, Inc.	6105 Chapel Hill Road Raleigh, NC 27607 Contact: Phillip Todd, Tel. 919-582-3575
Seeding Contractor	
River Works, Inc.	6105 Chapel Hill Road Raleigh, NC 27607 Contact: Phillip Todd, Tel. 919-582-3575
Seed Mix Sources	Green Resources, Greensboro, NC Tel. 336-855-6363 Arbor Gen Blenheim, SC, Tel.843-528-3204
Nursery Stock Suppliers	Mellow Marsh Farm, Silk Hope, NC, Tel. 919-742-1800
Monitoring Performers	
Michael Baker Engineering, Inc.	5550 Seventy-Seven Center Drive, Suite 320 Charlotte, NC 28217
	Contact:
Stream Monitoring Point of Contact:	Kristi Suggs, Tel. 704-665-2200
Vegetation Monitoring Point of Contact:	Kristi Suggs, Tel. 704-665-2200

Table 4. Project Background	
Little River Farm Site: Project No. 000623	
Project County:	Montgomery, NC
Drainage Area:	
Little River M1	50.42 mi^2
Little River M2	51.03 mi^2
UT1	0.68 mi^2
UT2	0.16 mi^2
UT3A	0.1 mi^2
UT3	0.16 mi^2
UT4	0.03 mi^2
UT4	0.03 mi^2

Table 4. Project Background	
Little River Farm Site: Project No. 000623	
Estimated Drainage % Impervious Cover:	
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
Stream Order:	
Little River M1	5th
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

Table 4. Project Background	
Little River Farm Site: Project No. 000623	
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 a crest gauge and photographs on the 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 by 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 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 – 2012 YEAR 3 - 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

Third year monitoring dimension and profile data of UT4 were surveyed in September 2012. Results from the third 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 permanent cross-sections along the restored portion of UT4 were re-surveyed to document stream dimension during September 2012. 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 in Year 2 and remains consistent in Year 3.

Longitudinal Profile

A longitudinal profile was resurveyed along the entire reach (515 LF) of UT4 in September 2012. The profile indicates that the majority of the bed features are stable throughout the reach. Changes in bed features consist predominantly of some filling in the pools. Pool–to–pool spacing on UT4 has increased when compared to the As-built survey. Riffle slopes have flattened slightly in comparison to As-built values.

When compared to the As-built profile data, pools at stations 11+70, 13+50, and 15+45 appear slightly aggraded, while the riffle at station 12+25 has degraded. Both aggradation and degradation seem to correspond to areas along the reach where stream bank erosion is evident. Though the channel was designed to transport sediment pulses throughout the system, the lack of adequate precipitation in the past three years have exacerbated conditions conducive to erosion, as well as, to flows inadequate to sufficiently transport sediment as designed.

Though the Year 3 survey and field assessment did not identify areas of significant instability along UT4, the channel will require maintenance activities to be conducted to stabilize stream banks and ensure the stability of the channel's grade control. It is anticipated that channel stabilization will allow pools that are currently filling to reform through scour and transport when precipitation levels return to more normal conditions; therefore, ensuring a stable substrate.

See Appendix B for additional geomorphic profile data. See Section 4.4 for anticipated remedial maintenance measures.

4.1.2 Stream Problem Areas Plan View

Currently, the constructed sections of stream channel are functioning as designed and most of the rock step pool structures were noted as stable; however, areas of erosion downstream of the headwall structure at Station 12+50 are migrating upstream and are impacting the stability of the structure.

Small pockets of erosion were noted on both the left and right banks during the previous monitoring years and likely developed from areas of deficient vegetation. These areas were reseeded and additional woody plant installation was implemented in the dormant season of 2012 to promote the project's vegetation success. Minor areas of streambank erosion were again noted during the Year 3 field review and are resultant from the areas of insufficient streambank vegetation. Please refer to Section 4.3.3 for further discussion of identified stream problem areas.

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

Table 5. Visual Morphological Stability Assessment

Little River Farm Site: Project No. 000623

UT4 (515 LF) Performance Percentage

Feature	Initial	MY-01	MY-02	MY-03	MY-04	MY-05
A. Riffles	100%	100%	100%	80%		
B. Pools	100%	100%	100%	60%		
C. Thalweg	100%	100%	100%	100%		
D. Meanders	100%	100%	100%	100%		
E. Bed General	100%	100%	100%	100%		
F. Bank Condition	100%	100%	84%	82%		
G. Vanes / J Hooks etc.	100%	100%	100%	89%		
H. Wads and Boulders	100%	99%	100%	89%		

4.2 Hydrology Data

The on-site crest gauge documented the occurrence of one bankfull event during the third year monitoring period. The highest stage recorded during the third year monitoring period was 0.31 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.

Table 6. Verification of Bankfull Events

Little River Farm Site: Project No. 000623

Location	Date of Data Collection	Date of Occurrence of Bankfull Event	Method of Data Collection	Gage Height (feet)	Photo # (If available)
UT4	9/14/2012	Between 12/1/2011 and 9/14/2012	Crest Gauge	0.31	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.

Data provided in Appendix C summarizes vegetation damage and stem count data for the monitoring plots during the Year 3 monitoring period. Year 3 monitoring data recorded from the 17 vegetation plots documented a range of 202 to 647 planted stems per acre with an average density of planted bare root stems of 474 stems per acre. Volunteer species were noted in Plots 4, 14 and 17. These species were flagged and included in the overall stems per acre assessment of this monitoring event. Based on these results, this site in general, has met the interim success criteria of an average of 320 stems per acre at the end of monitoring Year 3.

Supplemental stems were planted along portions of Little River, UT2 and UT4 during late winter of 2011 to improve the density of woody vegetation in areas where stem mortality was insufficient to meet project goals and success criteria. Prior to the end of Year 4, additional plantings will be implemented throughout Little River M1 and UT1 reaches near Vegetation Plots 3, 4 and 7 to improve woody vegetation counts to densities that will meet and/or exceed the success criteria required for Year 5.

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 2011 through October 2012 with recorded precipitation approximately 10 inches below the historic average. Precipitation varied greatly throughout the growing season with May considerably wetter than average and January, February, March, April and October significantly drier than average. The dry conditions evidenced this year are a continuation of a lack of consistent rainfall observed from the previous monitoring years. See Table 7 and Chart 1 for a comparison in historic and observed rainfall averages.

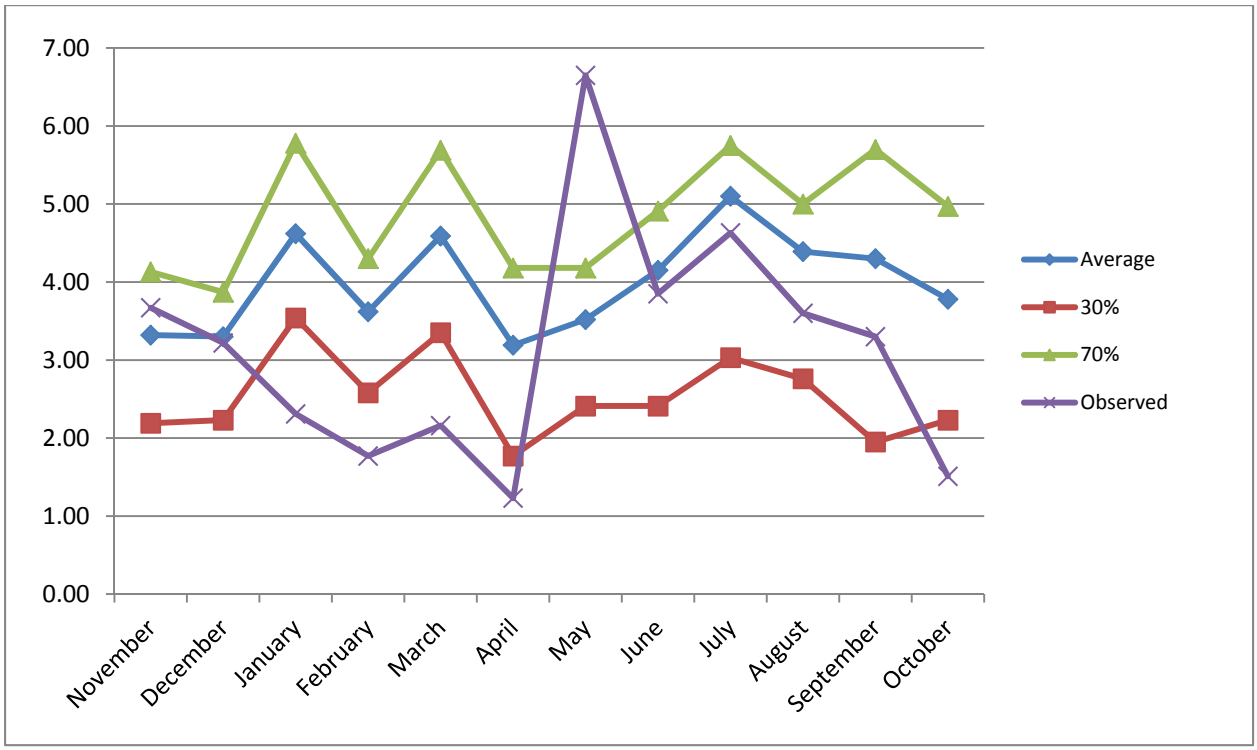
Lack of consistent rainfall during the past three growing seasons has impacted the riparian vegetation's ability to establish a deep root base and has limited their capacity to utilize water from ground water reserves. The affected vegetation then becomes overly stressed during times of drought, to degrees from which they cannot fully recover resulting in mortality. Specific to UT 4, stream flow has been absent or significantly lower due to limited precipitation. The subsequent lowering of the local water table in response to the limited precipitation has not only limited the evolution and development of the restored channel but has also limited the establishment of riparian vegetation, further limiting the development of the stream.

In addition to recent dry conditions, the majority of the flow within UT4, when present, originates from the adjacent roadway and is in response to larger precipitation events. The introduced flash flows from stormwater, in combination with inconsistent hydrology have presented additional stresses on the restored reach and have limited its ability to develop as anticipated.

Table 7. Comparison of Historic Rainfall to Observed Rainfall				
Little River Creek Farm Site : Project No. 000623				
Month	**Average**	**30%**	**70%**	**Observed 2011 - 2012 Precipitation***
November	3.32	2.19	4.13	3.67
December	3.30	2.23	3.87	3.22
January	4.62	3.54	5.78	2.31
February	3.62	2.58	4.30	1.77
March	4.59	3.35	5.69	2.16
April	3.19	1.77	4.18	1.23
May	3.52	2.41	4.18	6.65
June	4.15	2.41	4.91	3.85
July	5.10	3.03	5.75	4.63
August	4.39	2.76	5.00	3.60
September	4.30	1.95	5.70	3.30
October	3.78	2.23	4.97	1.51

NRCS National Climate and Water Center, 2000 and USGS, 2011-12
* 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 2011, & 2012)

Chart 1. Comparison of Historic Rainfall to Observed 2011-2012 Rainfall



4.3.2 Vegetation Plot Problems

Vegetation plot counts were conducted in September 2012. During this assessment, planted saplings were noted to be hand-cut in Vegetation Plot 2 and had been historically cut in Vegetation Plots 3 and 4. Observations indicate the cutting was in the area adjacent to the fence lines associated with the affected vegetation plots. Damage noted during both monitoring periods did not result in a significant

loss of vegetation within the project area; however, these areas will continue to be monitored to ensure their recovery and success. Additional areas (Vegetation Plots 2, 9, and 12 noted on figures C1a, C1b, and C1c) of concern included strangulation of planted species by vines mostly associated with *Ipomoea eriocarpa* (morning glory). Currently, the invasive species is limiting the growth of planted varieties; however, the effect within the plot has not damaged the vegetation to counts below the Year 3 success criteria. In order to prevent these species from spreading and becoming more densely populated, an herbicidal spot treatment application will be scheduled during 2013. See Figure C1a and C1b in Appendix C for the location of the vegetation plot problem areas.

4.3.3 Vegetation 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 were likely the result of poorly established streambank vegetation.

The visual assessment performed in Year 3 monitoring identified some identical areas of erosion as found in the previous monitoring season. Though the establishment of riparian vegetation along the restored reach has improved in comparison to Year 2, pockets of erosion were noted on the left bank at Stations 11+55 to 11+65, 11+75 to 11+90 and on the right bank at Stations 10+75 to 11+00, 12+20 to 12+50, 13+00 to 13+25, 13+75 to 13+90, and 14+25 to 14+50. Low vegetation density was also noted along the right floodplain near Station 12+50 through 13+00. See Figure C1c in Appendix C for an overview of all vegetative problem areas associated with the restored reach within UT4.

As mentioned, limited precipitation and the subsequent lowering of the local water table has limited the evolution and development of the restored channel and has significantly limited the establishment of riparian vegetation. In addition to recent dry conditions, stunted vegetation has limited the establishment of a tree canopy providing a habitat more suited for the growth and migration of fescue species from the adjacent pasture, developing a less suitable habitat for preferred riparian vegetation.

Other areas of concern were noted along UT1, UT3, the mainstem of Little River and its confluence with UT2. These areas were identified to have small established populations of *Ligustrum sinese* (Chinese privet), *Ipomoea eriocarpa* (morning glory), and *Rosa multiflora* (multi-flora rose) adjacent to and/or along their stream banks. Though present, these species are not dominant in any location throughout the project site. However, in order to prevent these species from spreading and becoming more densely populated, an herbicidal spot treatment application will be scheduled during 2013. See Table C.6 in Appendix C for problem area categories, locations, descriptions, causes, and photo log. See Figure C1a and C1b in Appendix C for an overview of noted invasive species locations.

4.3.4 Vegetative Problem Area Plan View

See Figures C1a, C1b, and C1c in Appendix C for an overview of all vegetative problem areas.

4.4 Areas of Concern

Areas of concern are located within isolated sections of the Little River mainstem where planted stems are sparse or have had limited success in establishing cover along the floodplain. At its confluence with UT2, in areas of UT3, and in limited locations along UT1, Chinese privet has established along the floodplain areas. Though there are areas of low-density planted stems and isolated pockets of invasive species, these areas are localized and are not currently impacting the stability of streambanks or structures within the enhanced and preserved reaches. To address these concerns, 1-inch bare root trees will be planted within the Conservation

Easement in locations where woody vegetation is sparse and canopy coverage is minimal. Spot treatment of invasive species with herbicides will also be scheduled for areas where privet, multi-flora rose, and morning glory have become established.

Establishment of vegetation along the restored reach has been limited by the lack of hydrology and the subsequent absence of a riparian canopy. The limited vegetation throughout the restored reach is affecting streambank stability and the development of the adjacent floodplain. Erosion has developed in areas along the streambanks that are exposed to flash flows and have limited cover and stability due to insufficient mature riparian vegetation. To address the areas of erosion, bioengineering measures such as small geo-lifts and/or brush mattresses will be implemented to stabilize streambanks.

Reseeding following the installation of the bioengineering measures will be scheduled for completion prior to the onset of the Year 4 growing season.

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.

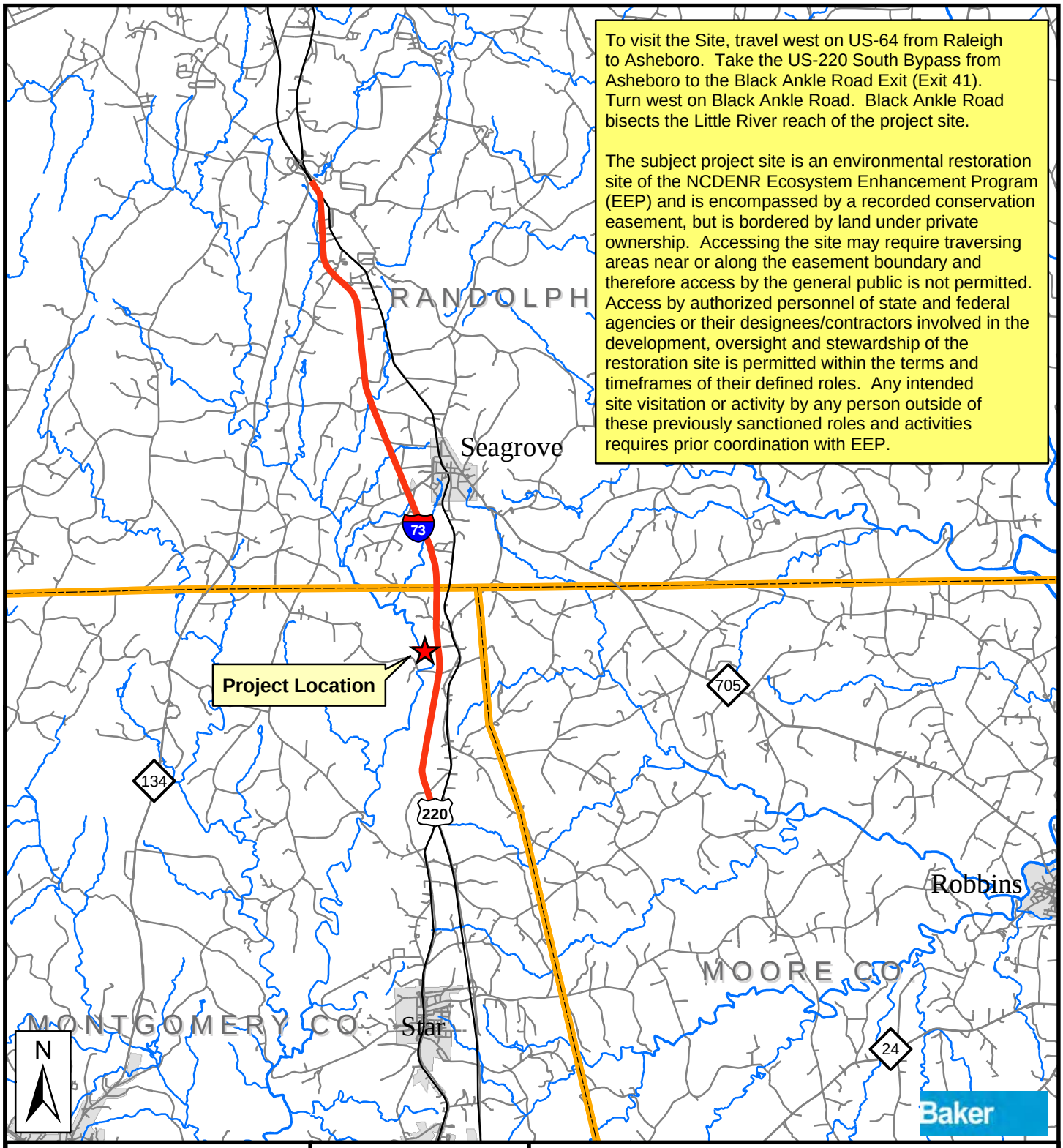
North Carolina Department of Environment and Natural Resources (NCDENR). 2006. Water Quality Stream Classifications for Streams in North Carolina. Water Quality Section, November 2006. Raleigh, NC.

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

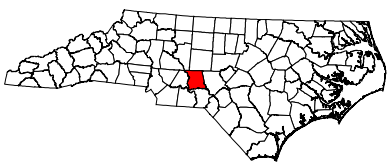
Rosgen, D. L. 1994. A Classification of Natural Rivers. Catena 22:169-199.

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

APPENDIX A:
FIGURES



Map Vicinity



Montgomery County, NC

Ecosystem Enhancement Program

EEP Project No.: 000623

March 2013

Figure 1. Project Vicinity Map

Little River Farm Site - Year 3 Monitoring

Montgomery County, NC

LEGEND

Location

County Boundaries

0 1.25 2.5 Miles

1 inch = 2.5 miles

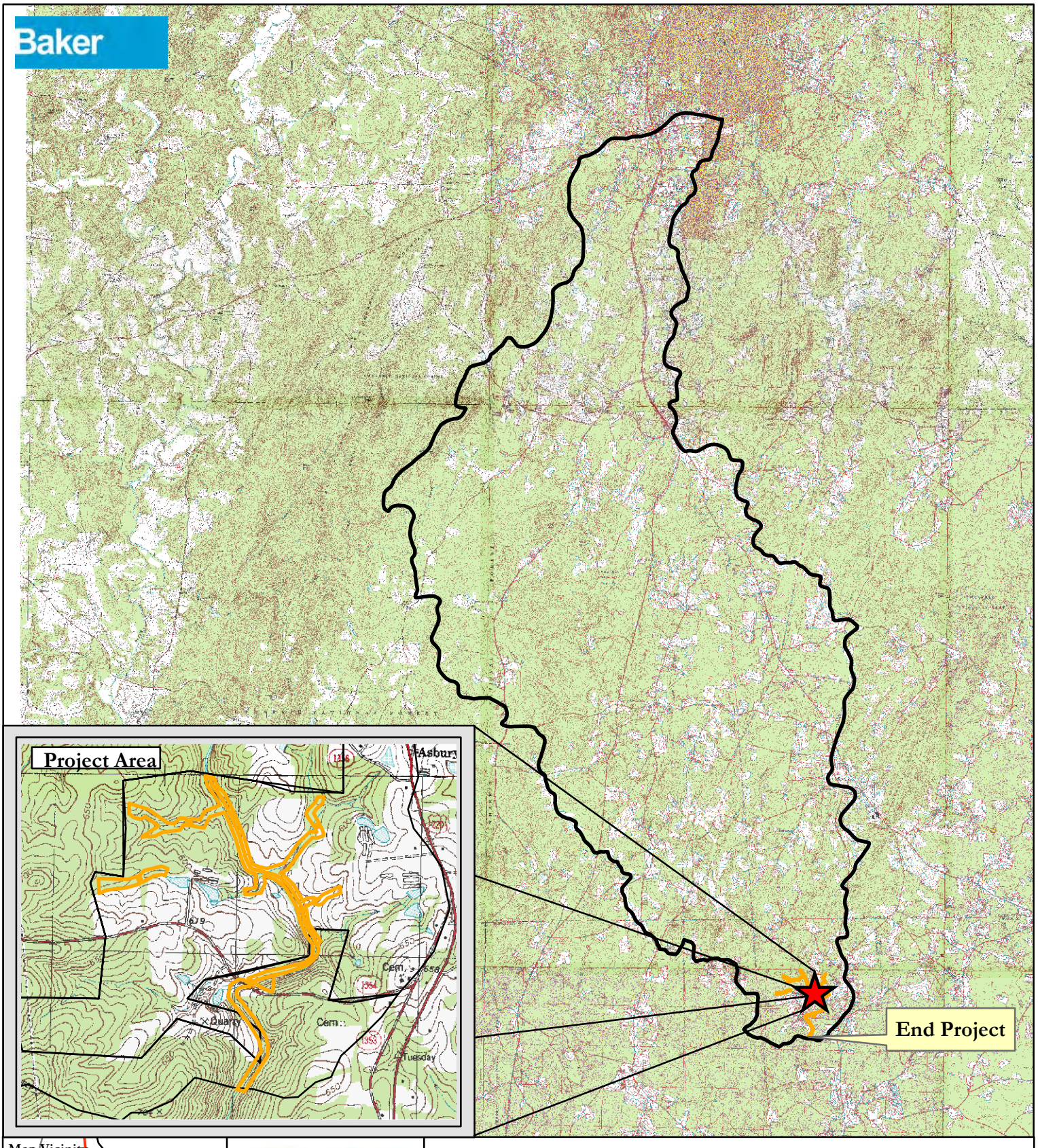
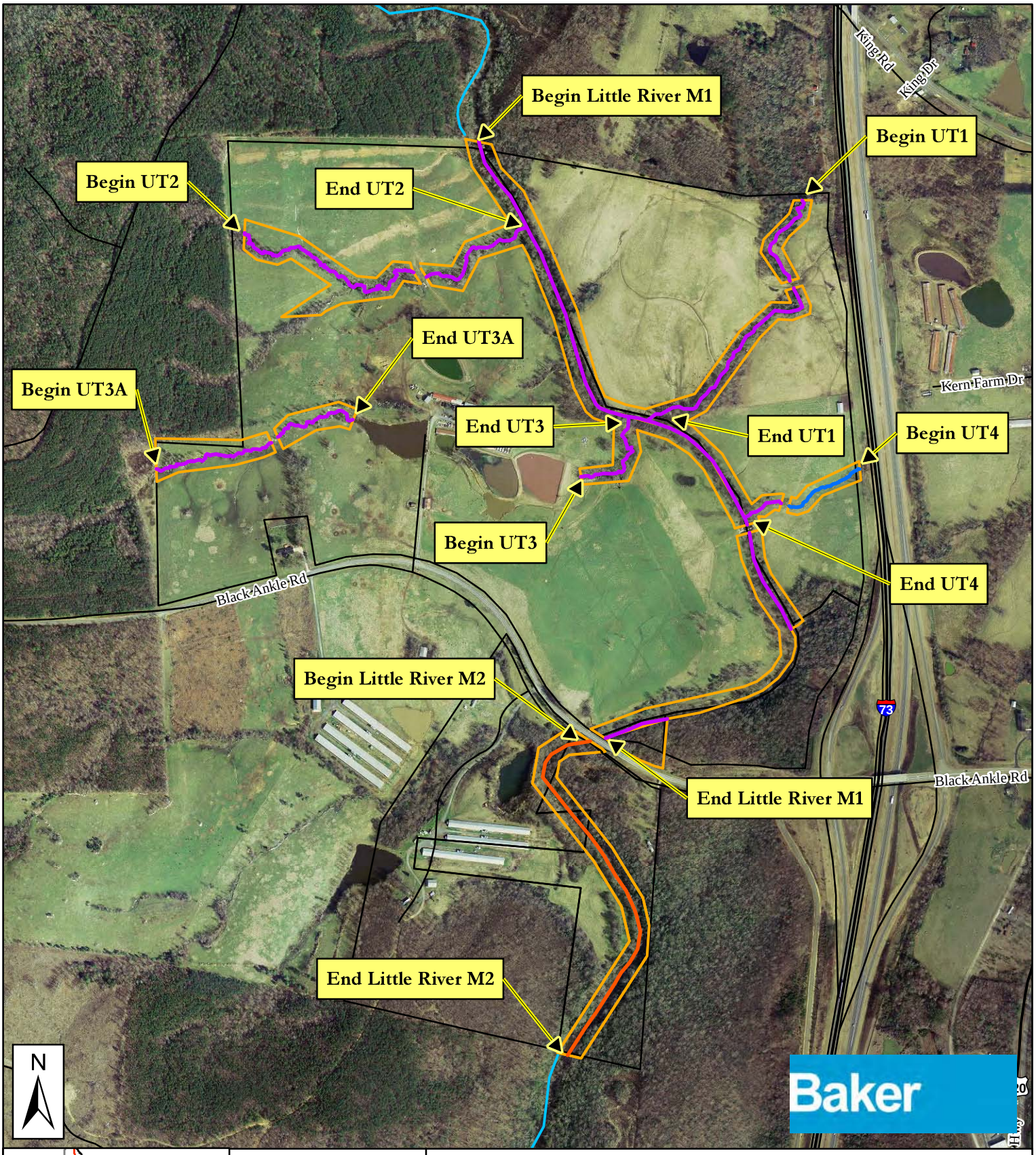
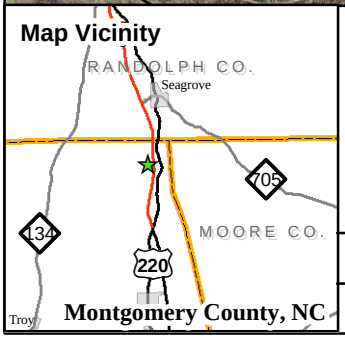


Figure 2. USGS Topographic & Watershed Map

Little River Farm Site - Year 3 Monitoring

Montgomery County, NC





Ecosystem Enhancement Program

EEP Project No.: 000623

March 2013

Figure 3. Project Summary Map

Little River Farm Site - Year 3 Monitoring

Montgomery County, NC

LEGEND

- Stream Enhancement II
- Stream Preservation
- Stream Restoration
- Streams
- Conservation Easement
- Project Parcels
- Roads

0 200 400 800 Feet

1 inch = 800 feet

APPENDIX B:
MORPHOLOGICAL DATA

CROSS-SECTIONS

Permanent Cross-section X1

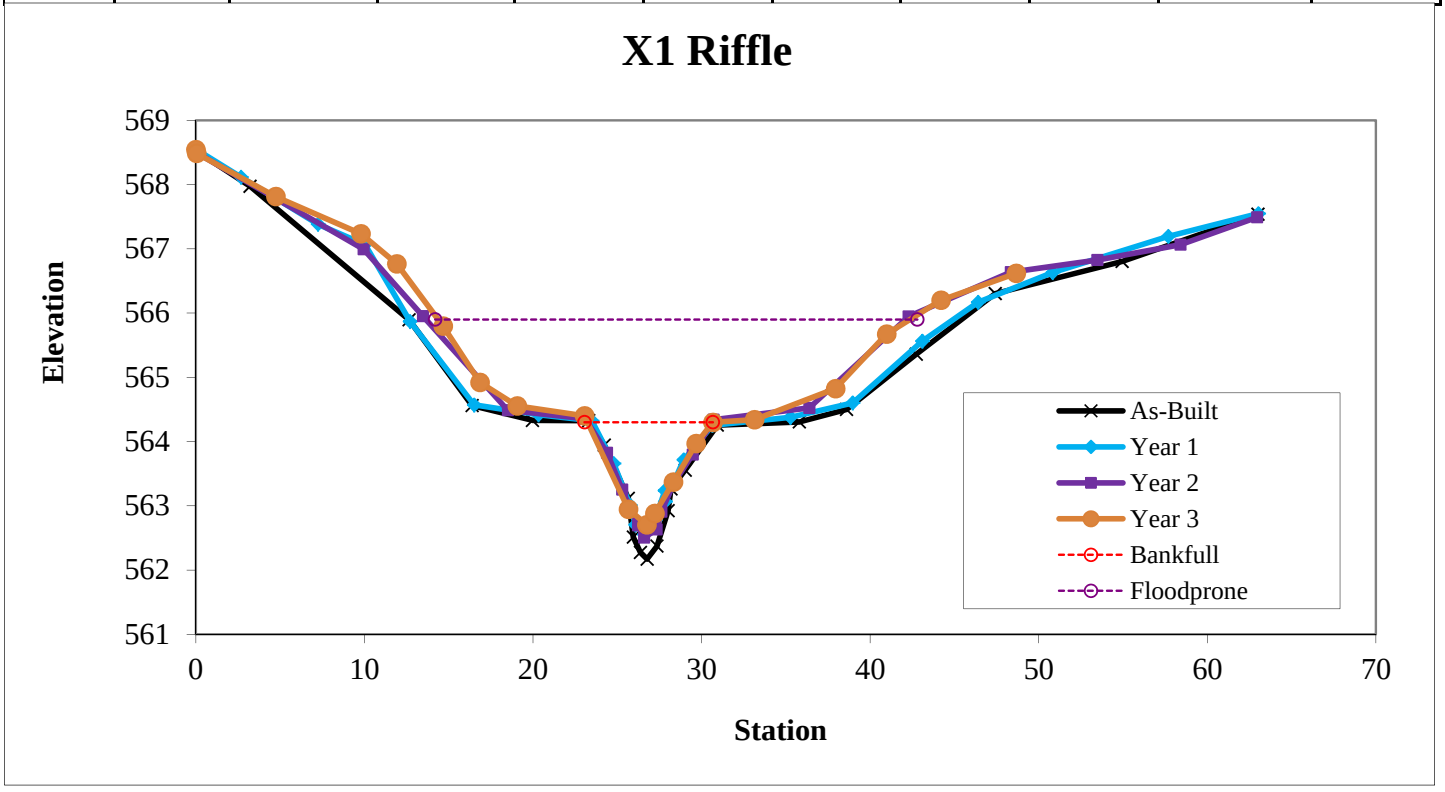
Little River Farm Site: Project No. 000623

(Year 3 Monitoring Data - Collected September 2012)

Looking Upstream

Looking Downstream

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	Cb	6.6	9.94	0.67	1.64	14.91	1	2.9	564.34	564.3



Permanent Cross-section X2

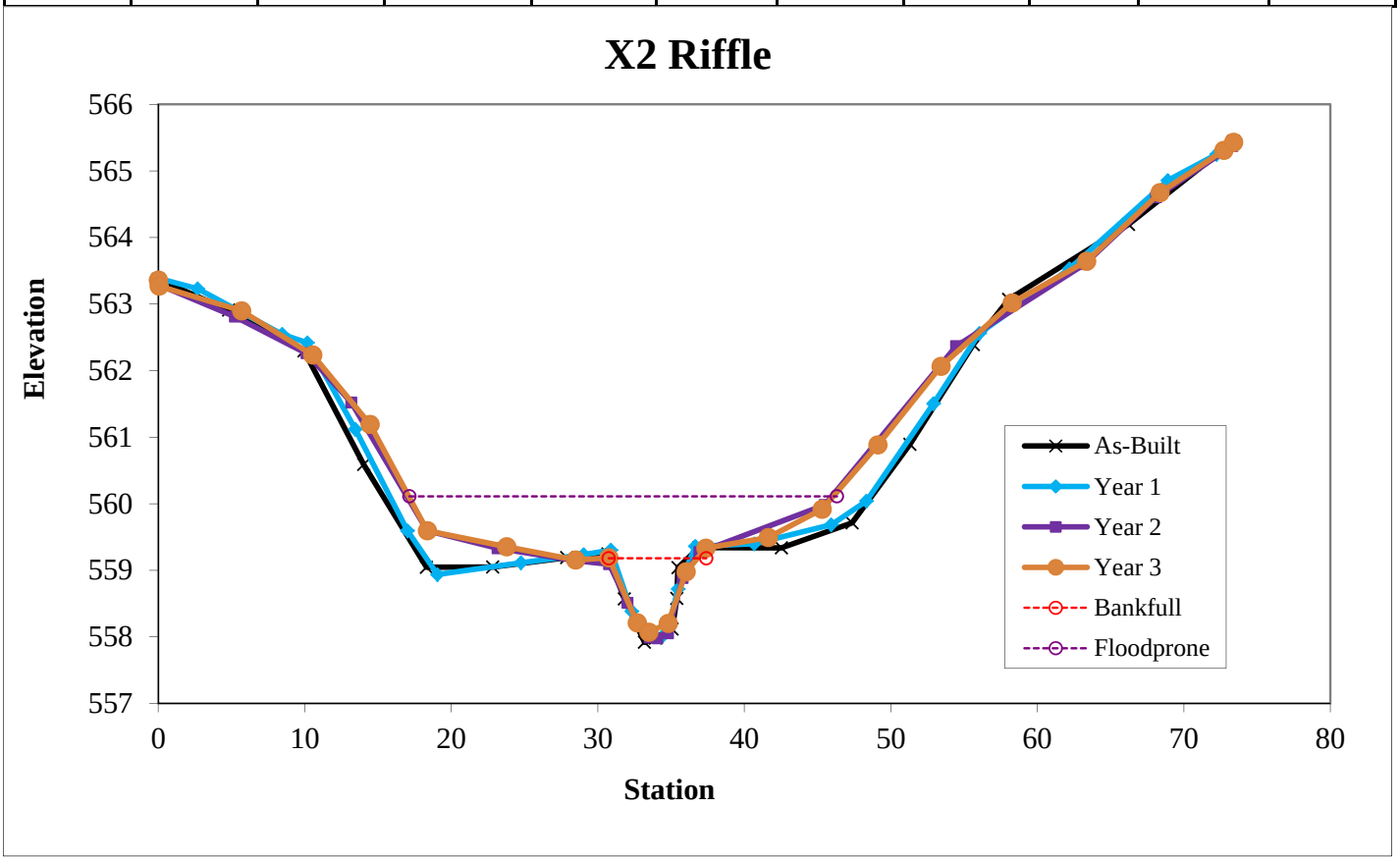
Little River Farm Site: Project No. 000623

(Year 3 Monitoring Data - Collected September 2012)

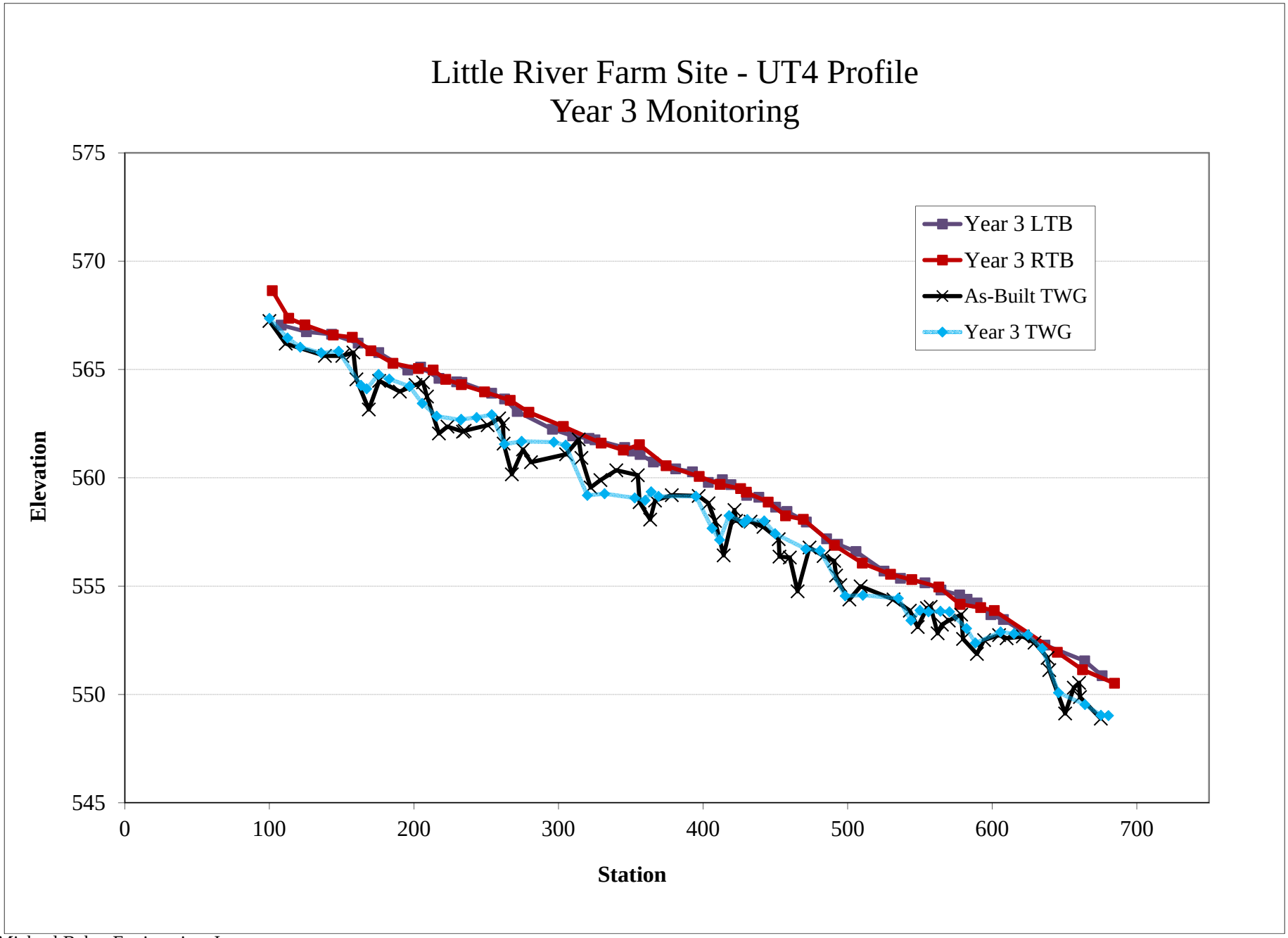
Looking Upstream

Looking Downstream

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	Eb	3.41	5.5	0.62	1.02	8.9	1	4.7	559.18	559.18



LONGITUDINAL PROFILE


Little River Farm Site - UT4 Profile
Year 3 Monitoring
575
570
565
560
555
550
545
Elevation
0
100
200
300
400
500
600
700
Station
Year 3 LTB
Year 3 RTB
As-Built TWG
Year 3 TWG

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					
											Silas Creek					
Dimension and Substrate - Riffle		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
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
Pattern																
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
Profile																
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)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																
Ri% / 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/f²	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Max part size (mm) mobilized at bankfull (Rosgen Curve)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Stream Power (transport capacity) W/m²	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Additional Reach Parameters																
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)*	-----	-----	-----	-----		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					
Dimension and Substrate - Riffle	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
BF Width (ft)	-----	6.5	-----	-----	-----	1	5.7	6.5	-----	7.2	-----	2	5.7	6.3	-----	7.0	-----	2
Floodprone Width (ft)	-----	-----	-----	-----	-----	1	35.9	36.0	-----	36.1	-----	2	32.7	34.1	-----	35.5	-----	2
BF Mean Depth (ft)	-----	0.80	-----	-----	-----	1	0.8	0.9	-----	0.9	-----	2	0.8	0.8	-----	0.8	-----	2
BF Max Depth (ft)	-----	0.6	-----	-----	-----	1	1.3	1.7	-----	2.0	-----	2	1.3	1.5	-----	1.7	-----	2
BF Cross-sectional Area (ft^2)	-----	3.8	-----	-----	-----	1	4.5	5.6	-----	6.6	-----	2	4.5	5.1	-----	5.7	-----	2
Width/Depth Ratio	-----	11.2	-----	-----	-----	1	7.3	7.6	-----	7.8	-----	2	7.1	7.9	-----	8.6	-----	2
Entrenchment Ratio	-----	2.0	-----	-----	-----	1	5.0	5.7	-----	6.3	-----	2	4.7	5.5	-----	6.3	-----	2
Bank Height Ratio	-----	1.0	-----	-----	-----	1	1.0	1.0	-----	1.0	-----	2	1.0	1.0	-----	1.0	-----	2
d50 (mm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pattern																		
Channel Beltwidth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rc:Bankfull width (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Width Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Profile																		
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
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
Pool Max Depth (ft)	-----	2.0	-----	-----	-----	1	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Volume (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters																		
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	----
Reach Shear Stress (competency) lb/f^2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	----
Max part size (mm) mobilized at bankfull (Rosgen Curve)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	----
Stream Power (transport capacity) W/m^2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	----
Additional Reach Parameters																		
Drainage Area (SM)	-----	-----	0.3	-----	-----	-----	-----	-----	-----	0.03	-----	-----	-----	-----	-----	0.03	-----	-----
Impervious cover estimate (%)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	B4	-----	-----	-----	-----	-----	E	-----	-----	-----	-----	-----	E	-----	-----	-----	-----
BF Velocity (fps)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Discharge (cfs)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valley Length	-----	500.0	-----	-----	-----	-----	-----	532.4	-----	-----	-----	-----	-----	530.9	-----	-----	-----	-----
Channel length (ft)	-----	550.0	-----	-----	-----	-----	-----	575.0	-----	-----	-----	-----	-----	578.2	-----	-----	-----	-----
Sinuosity	-----	1.10	-----	-----	-----	-----	-----	1.08	-----	-----	-----	-----	-----	1.09	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)*	-----	0.0310	-----	-----	-----	-----	-----	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.1. Baseline Stream Summary
Little River Farm Site: Project No. 000623

UT4 (515 LF)

Parameter	Year 2						Year 3					
Dimension and Substrate - Riffle	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
BF Width (ft)	5.6	6.6	-----	7.6	-----	2	5.5	7.7	-----	9.9	-----	2
Floodprone Width (ft)	29.6	30.6	-----	31.6	-----	2	28.6	28.9	-----	29.2	-----	2
BF Mean Depth (ft)	0.7	0.8	-----	0.9	-----	2	0.6	0.6	-----	0.7	-----	2
BF Max Depth (ft)	1.1	1.5	-----	1.8	-----	2	1.0	1.3	-----	1.6	-----	2
BF Cross-sectional Area (ft^2)	3.7	5.3	-----	6.8	-----	2	3.4	5.0	-----	6.6	-----	2
Width/Depth Ratio	8.4	8.5	-----	8.5	-----	2	8.9	11.9	-----	14.9	-----	2
Entrenchment Ratio	4.2	4.8	-----	5.3	-----	2	2.9	3.8	-----	4.7	-----	2
Bank Height Ratio	1.0	1.0	-----	1.0	-----	2	1.0	1.0	-----	1.0	-----	2
d50 (mm)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pattern												
Channel Beltwidth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Radius of Curvature (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rc:Bankfull width (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Wavelength (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Meander Width Ratio	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Profile												
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riffle Slope (ft/ft)	0.01*	0.02*	0.02*	0.05*	-----	9	0.01*	0.02*	0.03*	0.04*	-----	7
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	40.5*	47.0*	49.0*	54.5*	-----	9	46.9*	73*	76.15*	91.5*	-----	6
Pool Max Depth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Volume (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Substrate and Transport Parameters												
Ri% / Ru% / P% / G% / S%	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	----
SC% / Sa% / G% / B% / Be%	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	----
d16 / d35 / d50 / d84 / d95	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	----
Reach Shear Stress (competency) lb/f^2	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	----
Max part size (mm) mobilized at bankfull (Rosgen Curve)	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	----
Stream Power (transport capacity) W/m^2	-----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----	----
Additional Reach Parameters												
Drainage Area (SM)	-----	-----	-----	0.03	-----	-----	-----	-----	-----	0.03	-----	-----
Impervious cover estimate (%)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	E	-----	-----	-----	-----	-----	E	-----	-----	-----	-----
BF Velocity (fps)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Discharge (cfs)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valley Length	-----	530.9	-----	-----	-----	-----	-----	529.6	-----	-----	-----	-----
Channel length (ft)	-----	584.2	-----	-----	-----	-----	-----	580.4	-----	-----	-----	-----
Sinuosity	-----	1.10	-----	-----	-----	-----	-----	1.10	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)*	-----	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 (515 LF)												
	Cross-section 1 (Riffle)						Cross-section 2 (Riffle)					
Dimension and substrate	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Based on fixed baseline bankfull elevation												
BF Width (ft)	7.2	7.0	7.6	9.9			5.7	5.7	5.6	5.5		
BF Mean Depth (ft)	0.9	0.8	0.9	0.7			0.8	0.8	0.7	0.6		
Width/Depth Ratio	7.8	8.6	8.4	14.9			7.3	7.1	8.5	8.9		
BF Cross-sectional Area (ft^2)	6.6	5.7	6.8	6.6			4.5	4.5	3.7	3.4		
BF Max Depth (ft)	2.0	1.7	1.8	1.6			1.3	1.3	1.1	1.0		
Width of Floodprone Area (ft)	35.9	32.7	31.6	28.6			36.1	35.5	29.6	29.2		
Entrenchment Ratio	5.0	4.7	4.2	2.9			6.3	6.3	5.3	4.7		
Bank Height Ratio	1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0		
Wetted Perimeter (ft)	9.0	8.6	9.4	11.3			7.3	7.3	7.0	6.7		
Hydraulic Radius (ft)	0.7	0.7	0.7	0.6			0.6	0.6	0.5	0.5		
Based on current/developing bankfull feature												
BF Width (ft)	-	-	-				-	-	-			
BF Mean Depth (ft)	-	-	-				-	-	-			
Width/Depth Ratio	-	-	-				-	-	-			
BF Cross-sectional Area (ft^2)	-	-	-				-	-	-			
BF Max Depth (ft)	-	-	-				-	-	-			
Width of Floodprone Area (ft)	-	-	-				-	-	-			
Entrenchment Ratio	-	-	-				-	-	-			
Bank Height Ratio	-	-	-				-	-	-			
Wetted Perimeter (ft)	-	-	-				-	-	-			
Hydraulic Radius (ft)	-	-	-				-	-	-			
Cross Sectional Area between end pins (ft^2)	-	-	-				-	-	-			
d50 (mm)	-	-	-				-	-	-			

Table B.3. Stream Problem Areas Little River Farm Site: Project No. 000623			
UT4			
Feature Issue	**Station No.**	**Suspected Cause**	**Photo Number**
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 Perfomance Mean or Total
A. Riffles	1. Present?	8	10	0	80	
	2. Armor stable (e.g. no displacement)?	8	10	0	80	
	3. Facet grades appears stable?	8	10	0	80	
	4. Minimal evidence of embedding/fining?	8	10	0	80	
	5. Length appropriate?	8	10	0	80	**80%**
B. Pools	1. Present? (e.g. not subject to severe aggradation or migration?)	6	10	0	60	
	2. Sufficiently deep (Max Pool D:Mean Bkf >1.6?)	6	10	0	60	
	3. Length appropriate?	6	10	0	60	**60%**
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	**100%**
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	**100%**
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	**100%**
F. Bank	1. Actively eroding, wasting, or slumping bank	N/A	N/A	8/185	82	**82%**
G. Vanes	1. Free of back or arm scour?	8	9	0	89	
	2. Height appropriate?	8	9	0	89	
	3. Angle and geometry appear appropriate?	8	9	0	89	
	4. Free of piping or other structural failures?	8	9	0	89	**89%**
H. Wads/Boulders	1. Free of scour?	8	9	0	89	
	2. Footing stable?	8	9	0	89	**89%**

APPENDIX C:
VEGETATION DATA

VEGETATION RAW DATA

@ Little River Yr 3

Plot 92759-01-0001

Please fill in any missing data and fix incorrect data.

Vegetation Monitoring Data (VMD) Datasheet

VMD Year (1-5): 3 Date: 9/11/12 - / /

Taxonomic Standard:

Taxonomic Standard DATE:

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

Longitude or UTM-E:

Datum: NAD83/W GS84

UTM Zone:

Coordinate Accuracy (m):

X-Axis bearing (deg): 35.5

Plot Dimensions: X: 10 Y: 10 ☐ 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	Last Year's Data ddh 1 mm	Last Year's Data Height 1cm*	Last Year's Data DBH 1 cm	THIS YEAR'S DATA ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1500	Liriodendron tulipifera	(E)	R			10	87.0		15	132	5	☐	3		
1-1															
1501	Liriodendron tulipifera	(E)	R			11	60.0		16	101		☐	~~2~~ 3		
1-2															
1502	Liriodendron tulipifera	(E)	R			7	~~40.0~~		11	74		☐	3		
1-3															
1504	Corylus cornuta	(E)	R			7	77.0		6	73		☐	3		
1-5															
1505	Fraxinus pennsylvanica	(E)	R			9	46.0		6	56		☐	3		
1-6															
1506	Nyssa sylvatica	(E)	R			10	31.0		10	52		☐	3		
1-7									7	54			1		
1507	Nyssa sylvatica	(E)	R			8	55.0		~~6~~	~~54~~		☐	~~3~~		
1-8															
1508	Liriodendron tulipifera	(E)	R			4	27.0		6	32		☒	2		
1-9															
1509	Betula nigra	(E)	R			13	104.0	*DBH?*	13	111		☐	3		
1-10 Broken stem															
1510	Quercus falcata	(E)	R			13	100.0		19	166	5	☐	3		
1-11															
1511	Carya ovata	(E)	R			4	38.0		4	26		☐	1		
1-12 Broken stem															
1512	Celtis laevigata	(E)	R				*Missing*					☐			
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 marked persimmon?

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

*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.

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Plot 92759-01-0002 — **Please fill in any missing data and fix incorrect data.** — **Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5): 3 Date: 9/8/12 - / /

Taxonomic Standard:

Taxonomic Standard DATE:

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

Longitude or UTM-E:

Datum: NAD83/WGS84

UTM Zone:

Coordinate Accuracy (m):

X-Axis bearing (deg): 35.5

Plot Dimensions: X: 10 Y: 10 ☐ 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	Last Year's Data ddh 1 mm	Height 1cm*	DBH 1 cm	THIS YEAR'S DATA ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1513	Cornus amomum	E	R			11	113.0	*DBH?*	14	210	6	☐	3		
2-1															
1514	Cornus amomum	E	R			7	50.0		8	70	-	☐	2		
2-2															
1515	Cornus amomum	E	R			12	155.5	4.0	15	180	5	☒	3		cut
2-3 Broken stem but has new growth															
1516	Cornus amomum	E	R			9	98.0		15	190	6	☐	3		
2-4															
1517	Corylus cornuta	E	R			8	74.0		10	185	3	☐	3		
2-5															
1519	Platanus occidentalis	E	R			25	232.0	13.0	11	104		☒	4		cut
2-7															
1520	Quercus falcata	E	R			36	222.0	12.0	60	246	26	☐	2		morn glory
2-8															
1521	Cornus amomum	E	R			25	169.0	7.0	26	236	11	☐	4		
2-9															
1522	Cornus amomum	E	R			25	206.0	8.0	25	260	14	☐	4		
yr1: 2-10 | yr2: Main stem splitting															
1523	Cornus amomum	E	R			11	178.5	5.0	26	220	4	☐	4		
2-11															
1524	Cornus amomum	E	R			16	160.0	4.0	24	219	9	☐	4		
2-12															
1525	Cornus amomum	E	R			12	135.0	4.0	21	201	9	☐	4		
2-13															
1526	Cornus amomum	E	R			13	168.0	5.0	21	208	8	☐	4		
2-14 Broken limb															
1527	Cornus amomum	E	R			27	212.0	6.0	30	257	12	☐	4		
2-15															
1528	Cornus amomum	E	R			12	147.5	3.0	24	182	11	☐	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

*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.

Plot 92759-01-0003 — Please fill in any missing data and fix incorrect data. — **Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5): 3 Date: 9/14/12 - / /

Taxonomic Standard:

Taxonomic Standard DATE:

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

Longitude or UTM-E:

Datum: NAD83/WGS84

UTM Zone:

Coordinate Accuracy (m):

X-Axis bearing (deg): 35.5

Plot Dimensions: X: 10 Y: 10 ☐ 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	Last Year's Data ddh 1 mm	Height 1cm*	DBH 1 cm	THIS YEAR'S DATA ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1529	Betula nigra	E	R			23	200.0	6.0							
3-1	Dead														
1531	Betula nigra	E	R			22	6.0								
yr1: 3-3 | yr2: Intentional cut	Dead														
1533	Betula nigra	E	R			20	194.0	6.0							
3-5	Dead														
1534	Quercus michauxii	E	R			5	55.0		10	72	-		3		
3-6															
1535	Quercus michauxii	E	R	dead cut		10	20.0								
yr1: 3-7 Broken stem/new growth | yr2: Cut damage from last year															
1536	Platanus occidentalis	E	R			19	48.0		31	236	13		3		
yr1: 3-8 | yr2: Intentional cut															
1537	Quercus michauxii	E	R			14	69.0		9	31	-		1		
3-9				Cut											
1538	Corylus cornuta	E	R	dead		7	2.0								
3-10															
1539	Corylus cornuta	E	R			6	61.0		6	67	-		1		
3-11 Broken stem/new growth															
1540	Corylus cornuta	E	R			9	51.0		9	97	-		1		
3-12 Broken stem/new growth															

 # 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

Weed plots

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

*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.

Plot 92759-01-0004 — **Please fill in any missing data and fix incorrect data.** — **Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5): 3 Date: 9/11/12 - / /

Party: Role:

Notes on plot:

Taxonomic Standard:

Taxonomic Standard DATE:

Latitude or UTM-N: (dec.deg. or m) -79.788543 Datum: NAD83/WGS84

Longitude or UTM-E: 35.499207 UTM Zone:

Coordinate Accuracy (m): X-Axis bearing (deg): 35.499

Plot Dimensions: X: 10 Y: 10 ☐ 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	Last Year's Data ddh 1 mm	Height 1cm*	DBH 1 cm	THIS YEAR'S DATA ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
515	Celtis laevigata	E	R			7	55.0		10	50		☐	1		
4-1															
520	Quercus laurifolia	E	R			16	87.0					☐			
4-6	cut Dead														
524	Quercus laurifolia	E	R			11	21.0					☐			
	Dead														
yr1: 4-10 | yr2: Intentional cut															
525	Quercus laurifolia	E	R			23	29.0		26	131	6	☐	3		
yr1: 4-11 | yr2: Intentional cut (clean)															
527	Quercus laurifolia	E	R			16	24.0		19	90		☐	3		
yr1: 4-13 | yr2: Intentional cut															
2358	Quercus michauxii	E	R			6	44.0		6	55		☐	3		
4-14 - Supp Planting Spring 2011															
2359	Quercus michauxii	E	R			4	60.0		5	35		☐	2		
4-15 - Supp Planting Spring 2011															
2360	Betula nigra	E	R			4	73.0		7	102	4	☐	1		
4-16 - Supp Planting Spring 2011															

 # 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

4-17 Persimmon 18 | 116 | 3

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

*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): 3 Date: 9/18/12 - / /

Taxonomic Standard:

Taxonomic Standard DATE:

Latitude or UTM-N: (dec.deg. or m) Datum: NAD83/WGS84

Longitude or UTM-E: UTM Zone:

Coordinate Accuracy (m): X-Axis bearing (deg): 35.5

Plot Dimensions: X: 10 Y: 10 ☐ 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	Last Year's Data ddh 1 mm	Height 1cm*	DBH 1 cm	THIS YEAR'S DATA ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1542 5-1	Asimina triloba	E	R			6	47.0		8	65	–	☐	4		
1545 5-4	Asimina triloba	E	R			5	43.0		6	65	–	☐	3		
1546 5-5	Cornus florida	E	R			10	102.0	*DBH?*	14	136	5	☐	3		
1547 5-6	Cornus florida	E	R			11	68.0		15	210	–	☐	3		
1548 5-7	Cornus florida	E	R			14	107.0	*DBH?*	21	155	4	☐	3		
1549 5-8	Corylus cornuta	E	R			7	57.0		7	80	–	☐	3		
1550 5-9	Quercus michauxii	E	R			20	207.0	8.0	32	7270	19	☐	2		
1551 5-10	Quercus michauxii	E	R			17	174.0	10.0	29	226	13	☐	3		
1552 5-11	Quercus michauxii	E	R			26	195.0	10.0	55	270	26	☐	4		
1553 5-12	Liriodendron tulipifera	E	R			16	100.0		35	235	18	☐	4		
1554 5-13	~~Celtis laevigata~~ C. Florida	E	R			16	134.0	4.0	23	175	7	☐	3		

 # 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

*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): 3 Date: 9/14/12 - / /

Party: Role:

Notes on plot:

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): 35.5

Plot Dimensions: X: 10 Y: 10 ☐ 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	Last Year's Data ddh 1 mm	Height 1cm*	DBH 1 cm	THIS YEAR'S DATA ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1560	Fraxinus pennsylvanica	EI	R			8	73.0		20	157	9	☐	4		
6-6															
1561	Fraxinus pennsylvanica	EI	R			18	161.0	8.0	30	270	12	☐	4		
6-7															
1562	~~Betula nigra~~ QMi	EI	R			6	30.0		10	68		☐	~~3~~ 2		
yr1: 6-8 | yr2: Broken branches							MISSING								
1563	Fraxinus pennsylvanica	EI	R			13	74.0		21	124	-	☐	4		
6-9															
1564	Platanus occidentalis	EI	R			8	67.0		14	146		☐	3		
6-10															
1565	~~Betula nigra~~ C Cor	EI	R			21	114.0	*DBH?*	36	160	7	☐	3		
6-11															
1566	~~Platanus occidentalis~~ LT	EI	R			6	44.0		5	33	-	☐	3		
6-12															
1567	Platanus occidentalis	EI	R			27	157.0	7.0	35	226	16	☐	4		
6-13															
1568	Carpinus caroliniana	EI	R			8	65.0		11	84	-	☐	3		
6-14															
1569	Fraxinus pennsylvanica	EI	R			14	121.0	5.0	21	167	7	☐	3		
6-15															
1570	Carpinus caroliniana	EI	R			8	85.0		16	136		☐	3		
6-16															
1571	Platanus occidentalis	EI	R			10	66.0		15	141	6	☐	3		
6-17															
1572	Carpinus caroliniana	EI	R			10	100.0		4	166	13	☐	3		
6-18															
1573	Fraxinus pennsylvanica	EI	R			14	121.0	4.0	19	139	6	☐	2		
6-19															
2361	Quercus michauxii	EI	R			7	38.0		8	40	-	☐			
6-20 - Supp Planting Spring 2011															
2362	Fraxinus pennsylvanica	EI	R			12	86.0		20	131	5	☐	3		
6-21 - Supp Planting Spring 2011															

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

*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.

Plot 92759-01-0007 — Please fill in any missing data and fix incorrect data. — **Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5): 3 Date: 9/4/12 - / /

Taxonomic Standard:

Taxonomic Standard DATE:

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

Longitude or UTM-E:

Datum: NAD83/WGS84

UTM Zone:

Coordinate Accuracy (m):

X-Axis bearing (deg): 35.5

Plot Dimensions: X: 10 Y: 10 ☐ 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	Last Year's Data ddh 1 mm	Height 1cm*	DBH 1 cm	THIS YEAR'S DATA ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1574	Quercus laurifolia	EI	R			15	74.0		19	150	~	☐	3		
7-1															
1577	Quercus michauxii	EI	R			10	44.0		3	33	~	☐	1		
yr1: 7-4 | yr2: Broken branches															
1579	Quercus laurifolia	EI	R			14	115.0	*DBH?*	25	164	8	☐	3		
7-6															
1580	Quercus michauxii	EI	R			12	87.0		17	134	~	☐	2		
7-7															
1582	Liriodendron tulipifera	EI	R			10	31.0		18	37	~	☒	3		
7-9															

 # stems: 5

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

Take Photo

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

*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.

Plot 92759-01-0008 — Please fill in any missing data and fix incorrect data. — **Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5): 3 Date: 9/14/12 - / /

Party: Role:

Notes on plot:

Taxonomic Standard:

Taxonomic Standard DATE:

Latitude or UTM-N: (dec.deg. or m) Datum: NAD83/WGS84

Longitude or UTM-E: UTM Zone:

Coordinate Accuracy (m): X-Axis bearing (deg): 35.5

Plot Dimensions: X: 10 Y: 10 ☐ 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	Last Year's Data: ddh 1 mm	Height 1cm*	DBH 1 cm	THIS YEAR'S DATA: ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1591	Quercus michauxii	(E)	R			20	158.0	8.0	28	195	14	☐	2		
8-2															
1592	Quercus michauxii	(E)	R			13	124.0	4.0	17	154	4	☐	2		
8-3															
1595	Quercus laurifolia	(E)	R			11	131.0	3.0	25	226	15	☐	3		
yr1: 8-6 | yr2: Damanged trunk															
1596	Quercus laurifolia	(E)	R	Dead		12	49.0					☐			
8-7															
1597	Betula nigra	(E)	R			23	179.0	4.0	35	270	15	☐	3		
8-8															
1598	Asimina triloba	(E)	R			5	36.0		5	43	—	☐	3		
yr1: 8-9 | yr2: Damaged trunk)															
1599	Betula nigra	(E)	R			24	195.0	4.0	28	268	11	☐	3		
8-10															
1601	Platanus occidentalis	(E)	R			43	270.0	23.0	69	>270	42	☐	4		
yr1: 8-12 | yr2: Greater than 270															
1602	Fraxinus pennsylvanica	(E)	R			15	100.0		20	243	10	☐	4		
8-13															
1603	Fraxinus pennsylvanica	(E)	R			10	98.0		20	152	12	☐	4		
8-14															
1604	~~Platanus occidentalis~~ F. penn	(E)	R			10	90.0		21	131	8	☐	2		
8-15															
1605	Fraxinus pennsylvanica	(E)	R			14	117.0	*DBH?*	16	177	8	☐	3		
8-16															

 # 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

A few FP's Arecando Volunteers if needed

Take Photo

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

*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.

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Plot 92759-01-0009 — Please fill in any missing data and fix incorrect data. — **Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5): 3 Date: 9/19/12 - / /

Taxonomic Standard:

Taxonomic Standard DATE:

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

Longitude or UTM-E:

Datum: NAD83/WGS84

UTM Zone:

Coordinate Accuracy (m):

X-Axis bearing (deg): 35.5

Plot Dimensions: X: 10 Y: 10 ☐ Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X

Party: Role:

Notes on plot: 888 2165 551 1112

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Last Year's Data ddh 1 mm	Height 1cm*	DBH 1 cm	THIS YEAR'S DATA ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1607	Quercus falcata	E	R			12	101.0	*DBH?*	18	118	8	☐	2		bent
yr1: 9-2 | yr2: Bent over damaage															
1608	Quercus michauxii	E	R			36	188.0	9.0	59	270	26	☐	2		
9-3															
1609	Quercus falcata	E	R			30	200.0	15.0	51	<270	35	☐	3		
9-4															
1610	Cornus amomum	E	R			18	126.0	6.0	20	195	11	☐	4		
9-5															
1611	Corylus cornuta	E	R	Dead		6	105.0	*DBH?*				☐			MG
9-6															
1612	Cornus amomum	E	R	Dead		24	217.5	8.0				☐			MG
9-7															
1613	Cornus amomum	E	R			15	163.0	5.0	23	174	9	☐	4		
9-8															
1614	Corylus cornuta	E	R			8	88.0		10	90	-	☐	2		
9-9															
1615	Corylus cornuta	E	R			9	85.0		15	110	—	☐	3		
9-10															
1616	Cornus amomum	E	R	Dead		14	141.0	3.0				☐			MG
9-11															
1619	Platanus occidentalis	E	R			26	264.0	13.0	60	<270	31	☐	4		
9-14															
1620	Platanus occidentalis	E	R			18	166.0	9.0	31	245	16	☐	3		
9-15															
1621	Fraxinus pennsylvanica	E	R			17	122.0	4.0	27	165	7	☐	2		
9-16															
1622	Platanus occidentalis	E	R			37	212.0	17.0	60	<270	33	☐	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

morning glory infestation

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

*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.

Plot 92759-01-0010 — Please fill in any missing data and fix incorrect data. — **Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5): 3 Date: 9/13/12 - / /

Party: Role:

Notes on plot:

Taxonomic Standard:

Taxonomic Standard DATE:

Latitude or UTM-N: (dec.deg. or m) Datum: NAD83/WGS84

Longitude or UTM-E: UTM Zone:

Coordinate Accuracy (m): X-Axis bearing (deg): 35.5

Plot Dimensions: X: 10 Y: 10 ☐ 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	Last Year's Data ddh 1 mm	Height 1cm*	DBH 1 cm	THIS YEAR'S DATA ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1623	Betula nigra	E!	R			65	270.0	31.0	81	>270	50	☐	4		
yr1: 10-1 | yr2: Greater than 270 cm															
1624	Celtis laevigata	E!	R			5	48.0		10	36	–	☐	1		
10-2															
1625	Quercus laurifolia	E!	R			30	238.0	17.0	51	>270	31	☐	3		
10-3															
1626	Quercus michauxii	E!	R			21	148.0	9.0	30	248	15	☐	4		
10-4															
1627	Cornus amomum	E!	R			22	205.0	6.0	23	208	10	☐	4		
10-5															
1628	Quercus michauxii	E!	R			15	101.0	*DBH?*	23	181	8	☐	3		
10-6															
1629	Nyssa sylvatica	E!	R			12	98.0		12	138	–	☐			
10-7															
1630	Nyssa sylvatica	E!	R			17	144.0	4.0	15	190	6	☐	4		
10-8															
1632	Betula nigra	E!	R			64	270.0	40.0	89	>270	72	☐	4		
yr1: 10-10 | yr2: Greater than 270 cm															
1633	Platanus occidentalis	E!	R			47	270.0	30.0	74	>270	49	☐	4		
yr1: 10-11 | yr2: Greater than 270 cm															
1634	Celtis laevigata	E!	R			16	145.0	5.0	24	202	10	☐	4		
10-12															
1635	Cornus amomum	E!	R			25	195.0	11.0	38	133	11	☐	3		
10-13															
1636	Cornus amomum	E!	R			19	129.0	*DBH?*	29	173	6	☐	3		
10-14															
1637	~~Nyssa sylvatica~~ C Amomum	E!	R			15	121.0	*DBH?*	22	138	–	☐	2		
10-15															
1638	Cornus amomum	E!	R			16	141.0	4.0	24	165	9	☐	2		
10-16															

 # 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

*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): 3 Date: 9/13/12 - / /

Party: Role:

Notes on plot:

Taxonomic Standard:

Taxonomic Standard DATE:

Latitude or UTM-N: (dec.deg. or m) Datum: NAD83/WGS84

Longitude or UTM-E: UTM Zone:

Coordinate Accuracy (m): X-Axis bearing (deg): 35.5

Plot Dimensions: X: 10 Y: 10 ☐ 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	Last Year's Data ddh 1 mm	Height 1cm*	DBH 1 cm	THIS YEAR'S DATA ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1639	Quercus michauxii	E!	R			31	197.0	12.0	41	255	16	☐	3		
11-1															
1640	Quercus nigra	E!	R			7	53.0		6	45		☐	1		
11-2															
1641	Quercus nigra	E!	R			21	118.0	*DBH?*	24	78		☐	1		Deer Rub
11-3															
1642	Quercus falcata	E!	R			19	137.0	6.0	28	187	11	☐	3		
11-4															
1643	Quercus falcata	E!	R			27	182.0	10.0	39	218	16	☐	3		
11-5															
1644	Quercus laurifolia	E!	R			27	202.0	6.0	41	258	12	☐	3		
11-6															
1645	Quercus laurifolia	E!	R			20	153.0	6.0	36	7270	16	☐	3		Deer Rub
11-7															
1646	Betula nigra	E!	R			15	99.0		21	223	9	☐	4		
11-8															
1647	Fraxinus pennsylvanica	E!	R			9	69.0		12	84		☐	3		
11-9															
1648	Quercus falcata	E!	R			20	155.0	5.0	30	160	10	☐	3		
11-10															
1649	Quercus falcata	E!	R			23	195.0	8.0	37	7270	16	☐	3		
11-11															
1650	Quercus michauxii	E!	R			26	209.0	12.0	35	239	19	☐	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 I 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

*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 92759-01-0012

Please fill in any missing data and fix incorrect data.

Vegetation Monitoring Data (VMD) Datasheet

VMD Year (1-5): 3 Date: 9/13/12 - / /

Taxonomic Standard:

Taxonomic Standard DATE:

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

Longitude or UTM-E:

Datum: NAD83/W GS84

UTM Zone:

Coordinate Accuracy (m):

X-Axis bearing (deg): 35.5

Plot Dimensions: X: 10 Y: 10 ☐ 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	Last Year's Data ddh 1 mm	Height 1cm*	DBH 1 cm	THIS YEAR'S DATA ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1651	Quercus falcata	E	R			16	103.0	*DBH?*	23	124		☐	3		
12-1															
1652	Quercus laurifolia ?	E	R			24	194.0	9.0	36	216	17	☐	3		
12-2															
1653	Quercus laurifolia	E	R			15	120.0	*DBH?*	17	190	7	☐	3		
12-3															
1654	Quercus laurifolia	E	R			27	222.0	11.0	34	258	17	☐	3		
12-4															
1655	Liriodendron tulipifera	E	R			16	138.0	5.0	18	219	14	☐	4		
12-5															
1656	Quercus falcata	E	R			10	82.0		12	96		☐	2		
12-6															
1657	Quercus michauxii	E	R			39	179.0	15.0	46	211	25	☐	3		
12-7															
1658	Quercus michauxii	E	R			10	91.0		10	84		☐	2		
12-8															
1659	Betula nigra	E	R			49	270.0	18.0				☐			
yr1: 12-9 | yr2: Greater than 270 cm			Dead												
1660	Betula nigra	E	R			56	247.0	15.0	Cdp	257	33	☐	3		Vine Choke
12-10															
1661	Betula nigra	E	R	Dead		32	179.0	6.0				☐			
12-11															
1662	Liriodendron tulipifera	E	R			27	153.0	7.0	29	152	7	☐	2		
12-12															
1663	Quercus falcata	E	R			39	228.0	12.0	39	242	13	☐	1		Vine choke
12-13															
1665	Quercus falcata	E	R	Dead		5	30.0					☐			
12-15															

 # 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

*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): 3 Date: 9/17/12 - / /

Taxonomic Standard:

Taxonomic Standard DATE:

Latitude or UTM-N: (dec.deg. or m) -79.787995 Datum: NAD83/WGS84

Longitude or UTM-E: 35.498345 UTM Zone:

Coordinate Accuracy (m): X-Axis bearing (deg): 35.498

Plot Dimensions: X: 10 Y: 10 ☐ 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	Last Year's Data ddh 1 mm	Height 1cm*	DBH 1 cm	THIS YEAR'S DATA ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
528	Quercus falcata	E	R			10	105.0	*DBH?*	21	236	11	☐	3		
13-1															
530	Carpinus caroliniana	E	R			11	65.0		9	86	—	☐	3		
13-3															
531	Platanus occidentalis	E	R			30	246.0	12.0	45	270	28	☐	4		
13-4															
533	Platanus occidentalis	E	R			34	207.0	10.0	49	270	23	☐	4		
13-6															
534	Quercus michauxii	E	R			10	106.0	*DBH?*	19	205	10	☐	4		
13-7															
535	Quercus nigra	E	R			15	145.0	6.0	23	244	13	☐	3		
13-8															
537	Quercus falcata	E	R			25	156.0	9.0	37	>270	21	☐	3		
13-10															
538	Liriodendron tulipifera	E	R			20	158.0	6.0	35	263	19	☐	4		
13-11															
539	Liriodendron tulipifera	E	R			11	72.0		22	167	9	☐	3		
13-12															
540	Platanus occidentalis	E	R			21	131.0	6.0	25	196		☐	4		
13-13															
541	Quercus falcata	E	R			14	117.0	*DBH?*	24	224	10	☐	3		
13-14															
2367	Ulmus alata	E	U			9	92.0		13	154	-	☐	2		
13-15 - Volunteer															
2368	Fraxinus pennsylvanica	E	R			23	188.0	11.0	41	270	20	☐	4		
13-16 - Supp Planting Spring 2011															

 # 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

*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.

Plot 92759-01-0014

Please fill in any missing data and fix incorrect data.

Vegetation Monitoring Data (VMD) Datasheet

VMD Year (1-5): 3 Date: 9/7/12 - / /

Party: Role:

Notes on plot:

Taxonomic Standard:

Taxonomic Standard DATE:

Latitude or UTM-N: (dec.deg. or m) -79.789525 Datum: NAD83/WGS84

Longitude or UTM-E: 35.497667 UTM Zone:

Coordinate Accuracy (m): X-Axis bearing (deg): 35.498

Plot Dimensions: X: 10 Y: 10 ☐ 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	Last Year's Data ddh 1 mm	Height 1cm*	DBH 1 cm	THIS YEAR'S DATA ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
542	Cornus amomum	E	R			11	86.0		13	128	-	☐	3		Dead
14-1															
543	Cornus amomum	E	R			10	75.0		7	70	-	☐	2		
14-2															
544	Cornus amomum	E	R			10	101.0	DBH?	14	111	-	☐	3		Dead
14-3															
547	Quercus laurifolia	E	R			20	125.0	4.0	34	233	11	☐	3		
14-6															
549	Cornus amomum	E	R			12	63.0		14	111	-	☐	3		
yr1: 14-8 | yr2: Multiple dead stems															
552	Quercus falcata	E	R			11	118.0	DBH?	25	208	8	☐	3		
14-11															
2364	Quercus michauxii	E	R			7	63.0		16	111	-	☐	3		Dead
14-12 - Supp Planting Spring 2011															
2365	Quercus falcata	E	R			5	59.0		11	78	-	☐	3		
14-13 - Supp Planting Spring 2011															
2366	Quercus michauxii	E	R	Dead		5	44.0					☐			
14-14 - Supp Planting Spring 2011															

 # 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

15 F. penn 7 74 - 4

16. Persimmon 9 114 - 4

17 P. occ 4 - 31 - 3

18 Persimmon 4 - 29 - 3

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

*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.

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Plot 92759-01-0015 — Please fill in any missing data and fix incorrect data. — **Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5): 3 Date: 9/17/12 - / /

Party: Role:

Notes on plot:

Taxonomic Standard:

Taxonomic Standard DATE:

Latitude or UTM-N: (dec.deg. or m) Datum: NAD83/W GS84

Longitude or UTM-E: UTM Zone:

Coordinate Accuracy (m): X-Axis bearing (deg): 35.5

Plot Dimensions: X: 10 Y: 10 ☐ 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	Last Year's Data ddh 1 mm	Height 1cm*	DBH 1 cm	THIS YEAR'S DATA ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1668	Liriodendron tulipifera	E	R			21	102.0	*DBH?*	30	173	10	☐	3		
15-2															
1669	Liriodendron tulipifera	E	R			11	73.0		19	188	-	☐	3		
15-3															
1670	Liriodendron tulipifera	E	R			13	97.0		19	142	6	☐	3		
15-4 New Growth															
1674	Quercus falcata	E	R			29	232.0	13.0	33	231	21	☐	3		
15-8															
1675	Quercus falcata	E	R			17	141.0	7.0	28	>270	14	☐	2		
15-9															
1676	Quercus falcata	E	R			25	201.0	11.0	29	>270	21	☐	2		
15-10															
1680	~~Carya ovata~~ FP	E	R			16	135.0	5.0	17	205	-	☐	2		
15-14															
1681	Fraxinus pennsylvanica	E	R			32	232.0	15.0	39	>270	22	☐	3		
15-15															
1682	Quercus laurifolia	E	R			17	127.0	5.0	23	161	6	☐	3		
15-16															

 # 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

Plenty of Vols

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

*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 92759-01-0016 — Please fill in any missing data and fix incorrect data. — **Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5): 3 Date: 9/17/12 - / /

Party: Role:

Notes on plot: √ on Cornus Florida sp

Taxonomic Standard:

Taxonomic Standard DATE:

Latitude or UTM-N: (dec.deg. or m) Datum: NAD83/WGS84

Longitude or UTM-E: UTM Zone:

Coordinate Accuracy (m): X-Axis bearing (deg): 35.5

Plot Dimensions: X: 10 Y: 10 ☐ 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	Last Year's Data ddh 1 mm	Height 1cm*	DBH 1 cm	THIS YEAR'S DATA ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1683	~~Cornus amomum~~ Florida	E	R			7	70.0		7	81	–	☐	2		Deer
16-1															
1684	~~Celtis laevigata~~ Cor Amomum	E	R			9	72.0		10	71	–	☐	2		Deer
16-2															
1685	Quercus michauxii	E	R			39	256.0	25.0	47	>270	32	☐	3		
16-3															
1686	Quercus michauxii	E	R			26	212.0	15.0	42	>270	20	☐	3		
16-4															
1687	Quercus falcata	E	R			36	270.0	20.0	53	>270	34	☐	2		insect
yr1: 16-5 | yr2: Greater than 270															
1688	Cornus amomum	E	R			25	259.0	13.0	31	>270	18	☐	3		
16-6															
1689	Cornus amomum	E	R			20	227.0	11.0	29	257	14	☐	3		
16-7															
1690	Cornus amomum	E	R			27	188.0	6.0	36	242	14	☐	4		
16-8															
1691	Cornus amomum	E	R			14	111.0	*DBH?*	21	192	7	☐	3		
16-9															
1692	~~Celtis laevigata~~ Cor amomum	E	R			7	81.0		15	132	–	☐	3		
16-10															
1693	Cornus amomum	E	R			20	143.0	4.0	23	185	6	☐	3		
16-11															
1694	Cornus amomum	E	R	dead		20	130.0	5.0	–	–	–	☐	^		
16-12															
1695	Celtis laevigata	E	R	dead		7	43.0					☐			
16-13															
1696	Quercus ~~nigra~~ michauxii	E	R			22	139.0	7.0	31	223	16	☐	3		
16-14															
2363	Quercus falcata	E	R			4	60.0		10	100	–	☐	3		
16-15 - Supp Planting Spring 2011															

 # 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

*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): 3 Date: 9/11/12 - / /

Party: Role:

Notes on plot:

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): 35.5

Plot Dimensions: X: 10 Y: 10 ☐ 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	Last Year's Data ddh 1 mm	Height 1cm*	DBH 1 cm	THIS YEAR'S DATA ddh 1mm	Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
1697	Ulmus americana	(E)	R			30	137.0	7.0	40	193	9	☐	3		
17-1	Green Ash														
1699	Fraxinus pennsylvanica	(E)	R			29	187.0	10.0	36	245	15	☐	4		
17-3															
1700	Fraxinus pennsylvanica	(E)	R			40	207.0	10.0	54	7250	20	☐	4		
17-4															
1702	Platanus occidentalis	(E)	R			50	270.0	26.0	91	7250	45	☐	4		
yr1: 17-6 | yr2: Greater than 270															
1704	Quercus falcata	(E)	R			42	230.0	16.0	66	7250	47	☐	4		
17-8															
1707	Quercus ~~laurifolia~~ michauxii	(E)	R			5	50.0		11	85		☐	3		
17-11															
1708	Quercus nigra	(E)	R			6	46.0		8	60		☐	3		
17-12															
1923	Quercus michauxii	(E)	R			37	165.0	10.0	54	212	24	☐	4		
17-5 - Recorded as missing in Year 1 (Stem 1701)															
2369	Platanus occidentalis	(E)	R			9	75.0		17	150		☐	3		
17-13 - Supp Planting Spring 2011															
2370	Platanus occidentalis	(E)	R			13	117.0	*DBH?*	31	260	12	☐	4		
17-14 - Supp Planting Spring 2011															

 # 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

15 Tulippoplar 11/72 3

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

*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.

TABLES C.1 THROUGH C.7

Table C.1. Vegetation Metadata

Little River Farm Site: Project No. 000623	
Report Prepared By	Heath Caldwell
Date Prepared	11/6/2012 14:10
database name	cvs-eep-entrytool-v2.2.7.mdb
database location	C:\Documents and Settings\Heath.Caldwell\Desktop
computer name	CHABWHCALDWELL
file size	35381248
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
PROJECT SUMMARY----------	
Project Code	
project Name	92759
Description	Little River Farm
River Basin	Stream Enhancement, Restoration, and Preservation Project
length(ft)	Yadkin-Pee Dee
stream-to-edge width (ft)	56 ft
area (sq m)	80937.13
Required Plots (calculated)	17
Sampled Plots	17

Table C.2. Vegetation Vigor by Species

Little River Farm Site: Project No. 000623									
	Species	**CommonName**	**4**	**3**	**2**	**1**	**0**	**Missing**	**Unknown**
	Asimina triloba	pawpaw	1	2					
	Betula nigra	river birch	3	4		1	5		
	Carya ovata	shagbark hickory			1	1			
	Celtis laevigata	sugarberry	1	1		2	1		
	Cornus amomum	silky dogwood	12	12	4		3		
	Cornus florida	flowering dogwood		4	1				
	Diospyros virginiana	common persimmon	1	2					
	Fraxinus pennsylvanica	green ash	9	7	2				
	Nyssa sylvatica	blackgum	1	2	1	1			
	Quercus falcata	southern red oak	1	14	6	1	1		
	Quercus laurifolia	laurel oak		14			3		
	Quercus michauxii	swamp chestnut oak	5	12	7	2	2		
	Quercus nigra	water oak		2		2			
	Ulmus alata	winged elm			1				
	Carpinus caroliniana	American hornbeam		4					
	Corylus cornuta	beaked hazelnut		5	1	2	2		
	Liriodendron tulipifera	tuliptree	3	10	2				
	Platanus occidentalis	American sycamore	11	6	1				
TOT:	**18**	**18**	**48**	**101**	**27**	**12**	**17**		

Table C.3. Vegetation Damage by Species

Little River Farm Site: Project No. 000623

	Species	CommonName	Count of Damage Categories	(no damage)	Cut	Deer	Human Trampled	Insects	Unknown	Vine Strangulation	
	Asimina triloba	pawpaw	0	3							
	Betula nigra	river birch	5	8					3	2	
	Carpinus caroliniana	American hornbeam	0	4							
	Carya ovata	shagbark hickory	0	2							
	Celtis laevigata	sugarberry	1	5					1		
	Cornus amomum	silky dogwood	7	24	1	3			1	2	
	Cornus florida	flowering dogwood	1	4		1					
	Corylus cornuta	beaked hazelnut	2	8					1	1	
	Diospyros virginiana	common persimmon	0	3							
	Fraxinus pennsylvanica	green ash	0	18							
	Liriodendron tulipifera	tuliptree	0	15							
	Nyssa sylvatica	blackgum	0	5							
	Platanus occidentalis	American sycamore	1	17	1						
	Quercus falcata	southern red oak	5	18			1	1	1	2	
	Quercus laurifolia	laurel oak	4	13	1	1			2		
	Quercus michauxii	swamp chestnut oak	4	24	2	1			1		
	Quercus nigra	water oak	1	3		1					
	Ulmus alata	winged elm	0	1							
TOT:	**18**	**18**	**31**	**175**	**5**	**7**	**1**	**1**	**10**	**7**	

Table C.4. Vegetation Damage by Plot

Little River Farm Site: Project No. 000623

	plot	Count of Damage Categories	(no damage)	Cut	Deer	Human Trampled	Insects	Unknown	Vine Strangulation	
	92759-01-0001-year:3	0	12							
	92759-01-0002-year:3	3	12	2					1	
	92759-01-0003-year:3	6	4	2				4		
	92759-01-0004-year:3	2	7	1				1		
	92759-01-0005-year:3	0	11							
	92759-01-0006-year:3	0	16							
	92759-01-0007-year:3	0	5							
	92759-01-0008-year:3	1	11					1		
	92759-01-0009-year:3	4	10			1			3	
	92759-01-0010-year:3	0	15							
	92759-01-0011-year:3	2	10		2					
	92759-01-0012-year:3	4	10					1	3	
	92759-01-0013-year:3	0	13							
	92759-01-0014-year:3	4	9		3			1		
	92759-01-0015-year:3	0	9							
	92759-01-0016-year:3	5	10		2		1	2		
	92759-01-0017-year:3	0	11							
TOT:	**17**	**31**	**175**	**5**	**7**	**1**	**1**	**10**	**7**	

Table C.5. Vegetation Damage by Plot

Little River Farm Site: Project No. 000623																								
	Comment	Species	CommonName	Total Planted Stems	# Plots	Avg# stems	plot 92759-01-0001-year:3	plot 92759-01-0002-year:3	plot 92759-01-0003-year:3	plot 92759-01-0004-year:3	plot 92759-01-0005-year:3	plot 92759-01-0006-year:3	plot 92759-01-0007-year:3	plot 92759-01-0008-year:3	plot 92759-01-0009-year:3	plot 92759-01-0010-year:3	plot 92759-01-0011-year:3	plot 92759-01-0012-year:3	plot 92759-01-0013-year:3	plot 92759-01-0014-year:3	plot 92759-01-0015-year:3	plot 92759-01-0016-year:3	plot 92759-01-0017-year:3
		Asimina triloba	pawpaw	3	2	1.5				2			1										
		Betula nigra	river birch	8	6	1.33	1			1			2		2	1	1						
		Carpinus caroliniana	American hornbeam	4	2	2					3							1					
		Carya ovata	shagbark hickory	2	2	1	1													1			
		Celtis laevigata	sugarberry	4	3	1.33				1					2						1		
		Cornus amomum	silky dogwood	28	5	5.6		12						2	4				4		6		
		Cornus florida	flowering dogwood	5	2	2.5					4										1		
		Corylus cornuta	beaked hazelnut	8	6	1.33	1	1	2		1	1		2									
		Diospyros virginiana	common persimmon	3	2	1.5				1									2				
		Fraxinus pennsylvanica	green ash	18	9	2	1					6		3	1		1		1	1	1		3
		Liriodendron tulipifera	tuliptree	15	8	1.88	4				1	1	1					2	2		3		1
		Nyssa sylvatica	blackgum	5	2	2.5	2								3								
		Platanus occidentalis	American sycamore	18	9	2		1	1			3		2	3	1			3	1			3
		Quercus falcata	southern red oak	22	10	2.2	1	1							2		4	3	3	2	3	2	1
		Quercus laurifolia	laurel oak	14	9	1.56				2			2	1		1	2	3		1	1		1
		Quercus michauxii	swamp chestnut oak	26	14	1.86			2	2	3	2	2	2	1	2	2	2	1	1		3	1
		Quercus nigra	water oak	4	3	1.33											2		1				1
		Ulmus alata	winged elm	1	1	1													1				
TOT:	**0**	**18**	**18**	**188**	**18**		**11**	**15**	**5**	**7**	**11**	**16**	**5**	**11**	**11**	**15**	**12**	**11**	**13**	**12**	**9**	**13**	**11**

Table C.6. Vegetative Problem Areas

Little River Farm Site: Project No. 000623			
UT4			
Feature/Issue	Station # / Range	Probable Cause	Photo #
Bare Bank			
Raw Bank (Right)	10+75 - 10+90	Poorly established streambank vegetation	C.6-1, C.6-4, C.6-6 through C.6-8
	12+20 - 12+50	Poorly established streambank vegetation	
	13+00 - 13+25	Poorly established streambank vegetation	
	13+75 - 13+90	Poorly established streambank vegetation	
	14+25 - 14+50	Poorly established streambank vegetation	
Bare Bench (Left)	11+55 to 11+65	Poorly established streambank vegetation	C.6-2 and C.6-3
	11+75 to 11+90	Poorly established streambank vegetation	
Bare Floodplain (Right)	12+50 - 13+00	Poorly established streambank vegetation	C.6-5
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	Year 3 Totals	Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17					
Asimina tuiloba					2			1										3	3	3	3	
Betula nigra	1			1				2		2	1	1						17	15	15	8	
Carpinus caroliniana						3							1					4	4	4	4	
Carya ovata	1														1			7	4	2	2	
Celtis laevigata				1						2						1		9	8	7	4	
Cornus amomum		12							2	4				4		6		34	33	31	28	
Cornus florida					4											1		3	3	3	5	
Corylus cornuta	1	1	2		1	1			2									13	12	9	8	
Fraxinus pennsylvanica				1										2				14	14	16	3	
Liriodendron tulipiferra	1					6		3	1		1		1	1	1		3	24	19	13	18	
Nyssa sylvatica	4				1	1	1					2	2		3		1	7	5	5	15	
Platanus occidentalis	2									3								23	17	18	5	
Quercus falcata var. *pagodifilia*		1	1			3		2	3	1			3	1			3	28	22	23	18	
Quercus laurifolia	1	1							2		4	3	3	2	3	2	1	27	19	17	22	
Quercus michauxii				2			2	1		1	2	3		1	1		1	27	23	26	14	
Quercus nigra			2	2	3	2	2	2	1	2	2	2	1	1		3	1	5	5	5	26	
Ulmus alata											2		1				1	0	0	1	4	
Ulmus americana													1					2	1	1	1	
Stems/plot	11	15	5	7	11	16	5	11	11	15	12	11	13	12	9	13	11	247	207	199	188	
Stems/Acre Year 3	445	607	202	283	445	647	202	445	445	607	486	445	526	486	364	526	445					**447**
Stems/Acre Year 2	445	607	405	324	445	647	202	486	566	607	486	566	526	364	364	607	405	N/A	N/A	N/A	N/A	**474**
Stems/Acre Year 1	486	607	486	324	445	688	526	526	566	647	486	607	486	324	405	566	202					**493**
Stems/Acre Initial	526	647	526	526	526	769	647	647	688	647	486	647	566	445	647	566	486					**588**

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

VPA 1 – Privet along right bank Little River, and along left bank UT2

VPA 2 – Veg Plot 9 dominated by Morning Glory (*Ipomoea eriocarpa)*

VPA 3 – Privet along right bank of Little River near Vegetation Plot 1

VPA 4 – Privet along right bank near UT1 crossing

VPA 5 – Privet becoming established along both banks of UT1 near confluence with Little River

UT4
VEG PROBLEM AREA PHOTOS

C.6-1. Station 10+75 – 10+90

C.6-2. Station 11+55 – 11+65

C.6-3 Station 11+75 – 11+90

C.6-4. Station 12+20 – 12+50

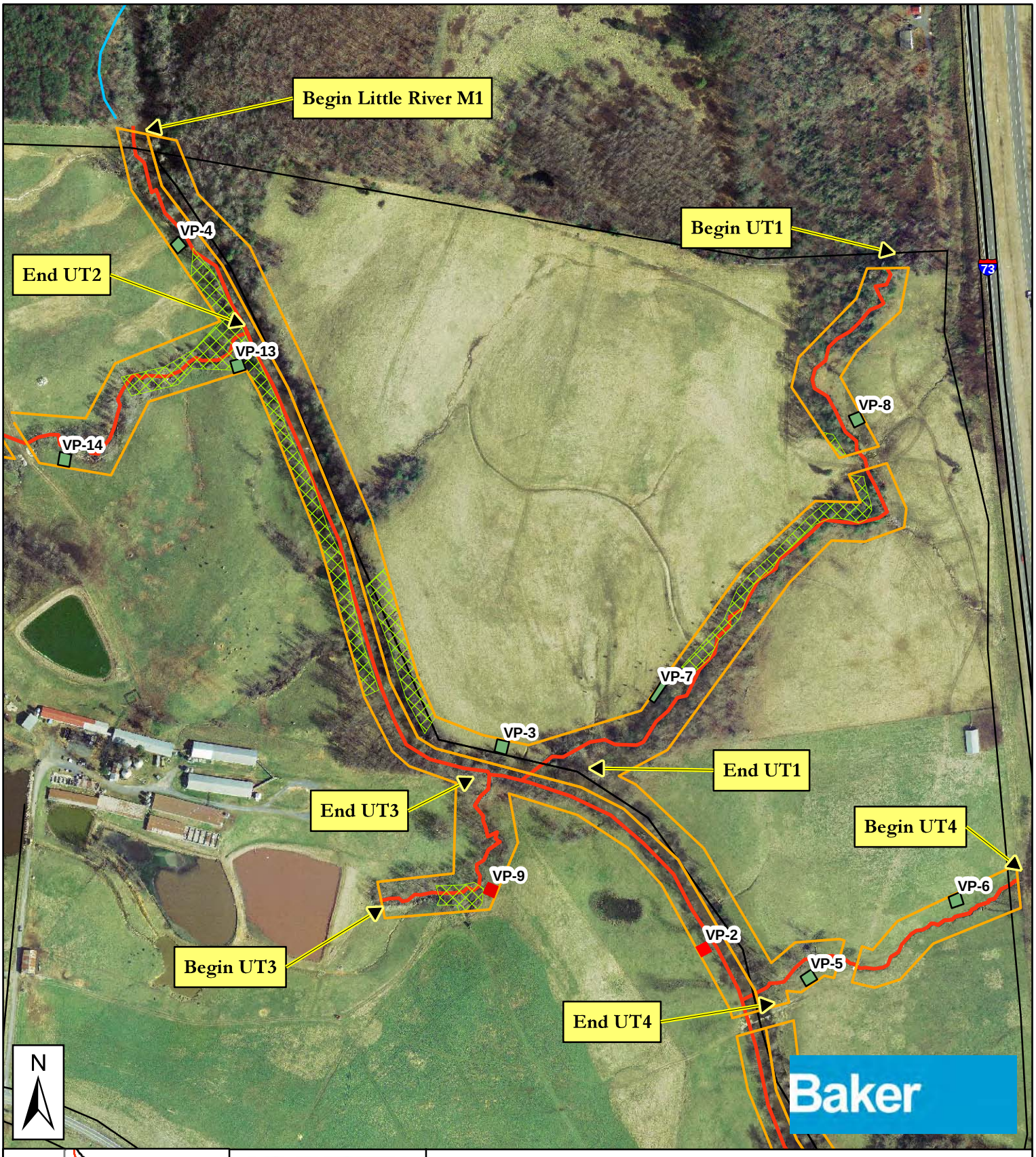
C.6-5. Station 12+50 – 13+00

C.6-6. Station 13+00 – 13+25

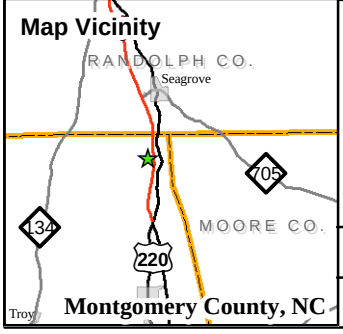
C.6-7. Station 13+75 – 13+90

C.6-8. Station 14+25 – 14+50

VEGETATION PROBLEM AREAS
FIGURE C1



Map Vicinity



Ecosystem Enhancement Program

EEP Contract No.: 000623

March 2013

Figure C1a. Vegetation Problem Areas

Little River Farm Site - Year 3 Monitoring

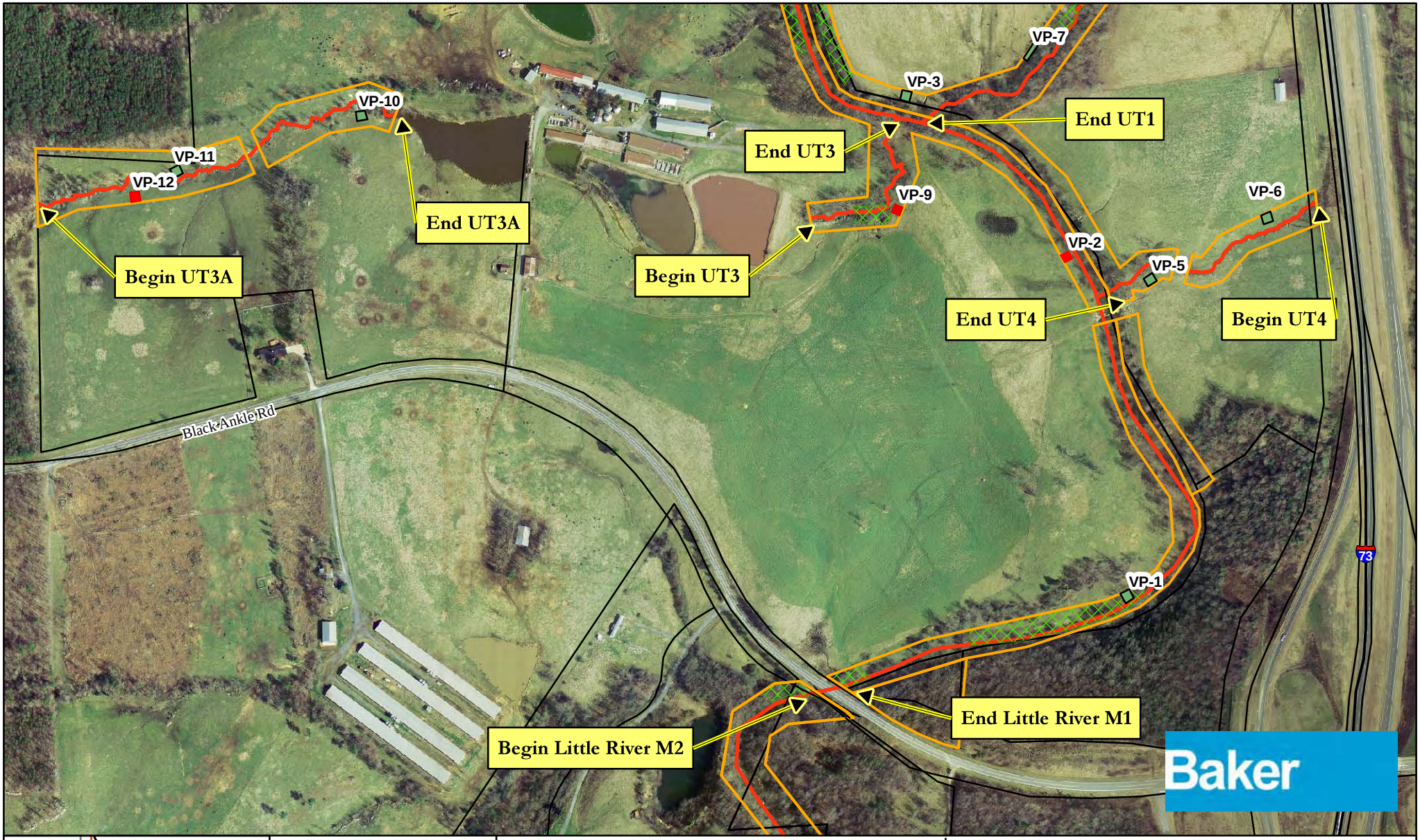
Montgomery County, NC

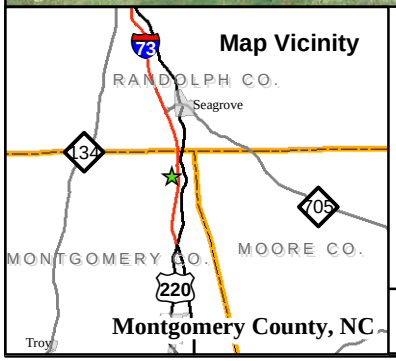
LEGEND

- Invasives Noted
- Veg Plots
- VP-2 (Morning Glory)
- VP-9 (Morning Glory)
- Streams
- Conservation Easement

1 inch = 350 feet

0 175 350 700 Feet





Ecosystem Enhancement Program

EEP Contract No.: 000623

Figure C1b. Vegetation Problem Areas

Little River Farm Site - Year 3 Monitoring

Montgomery County, NC

March 2013

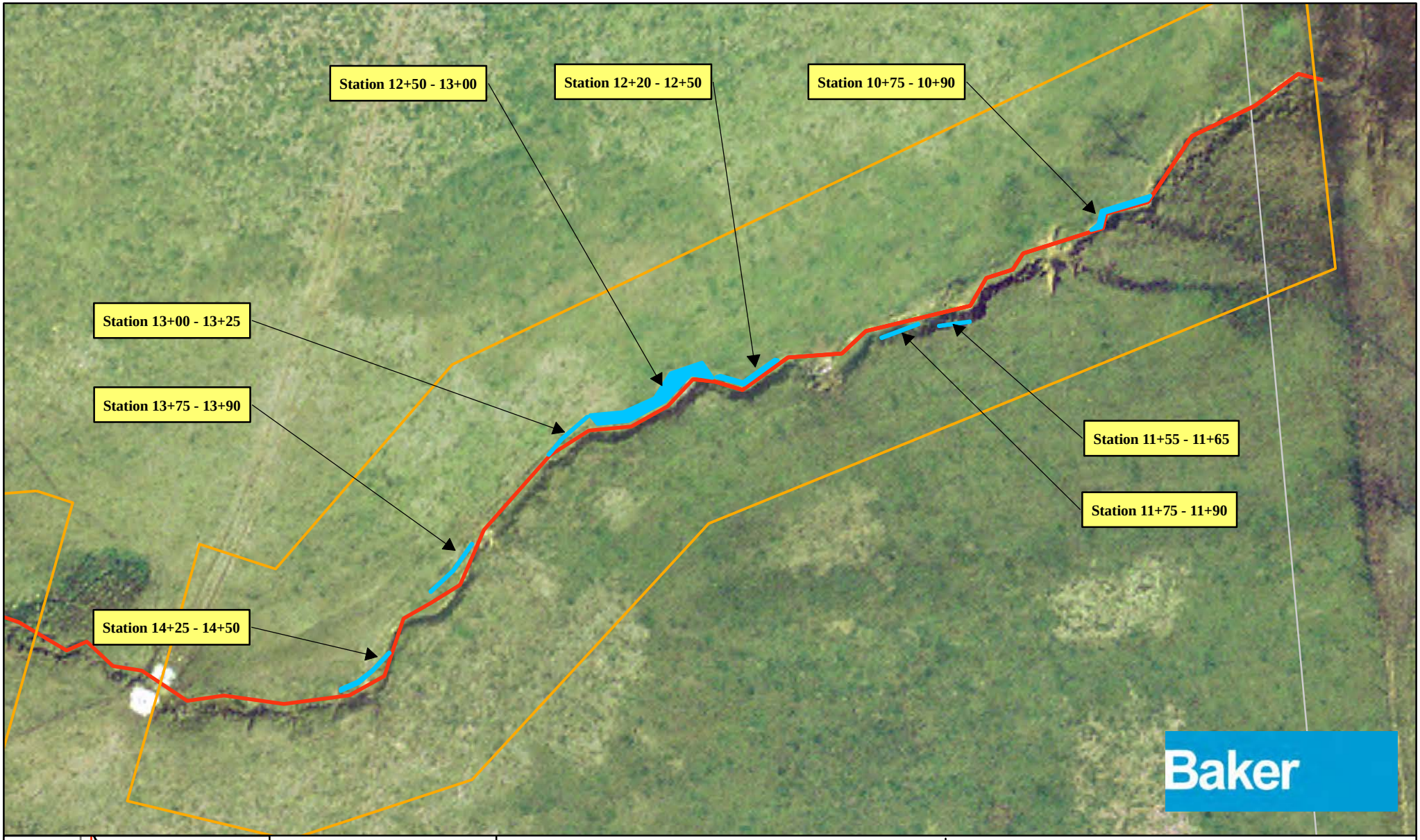
N

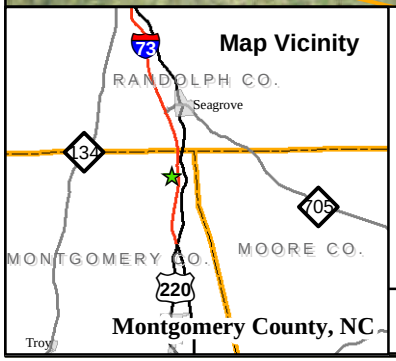
LEGEND

- Invasives Noted
- Veg Plots
- VP-2 (Morning Glory)
- VP-9 (Morning Glory)
- VP-12 (Morning Glory)
- Streams
- Roads
- Project Parcels
- Conservation Easement

1 inch = 450 feet

0 225 450 Feet





Ecosystem Enhancement Program

EEP Project No.: 000623

Figure C1c. UT4 Vegetation Problem Areas

Little River Farm Site - Year 3 Monitoring

Montgomery County, NC

March 2013

N

LEGEND

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

1 inch = 50 feet

0 25 50 Feet

APPENDIX D:
AS-BUILT PLAN SHEETS

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

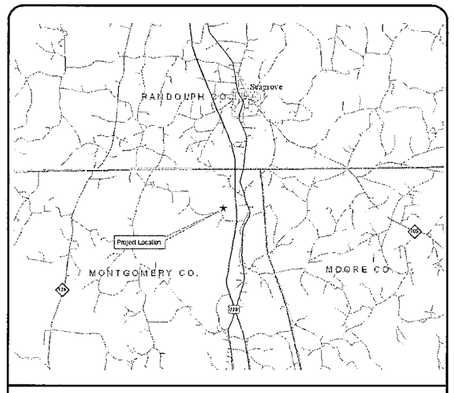
ECOSYSTEM ENHANCEMENT PROGRAM

MONTGOMERY COUNTY

LOCATION: OFF US 220 AND BLACK ANKLE ROAD SR 1354

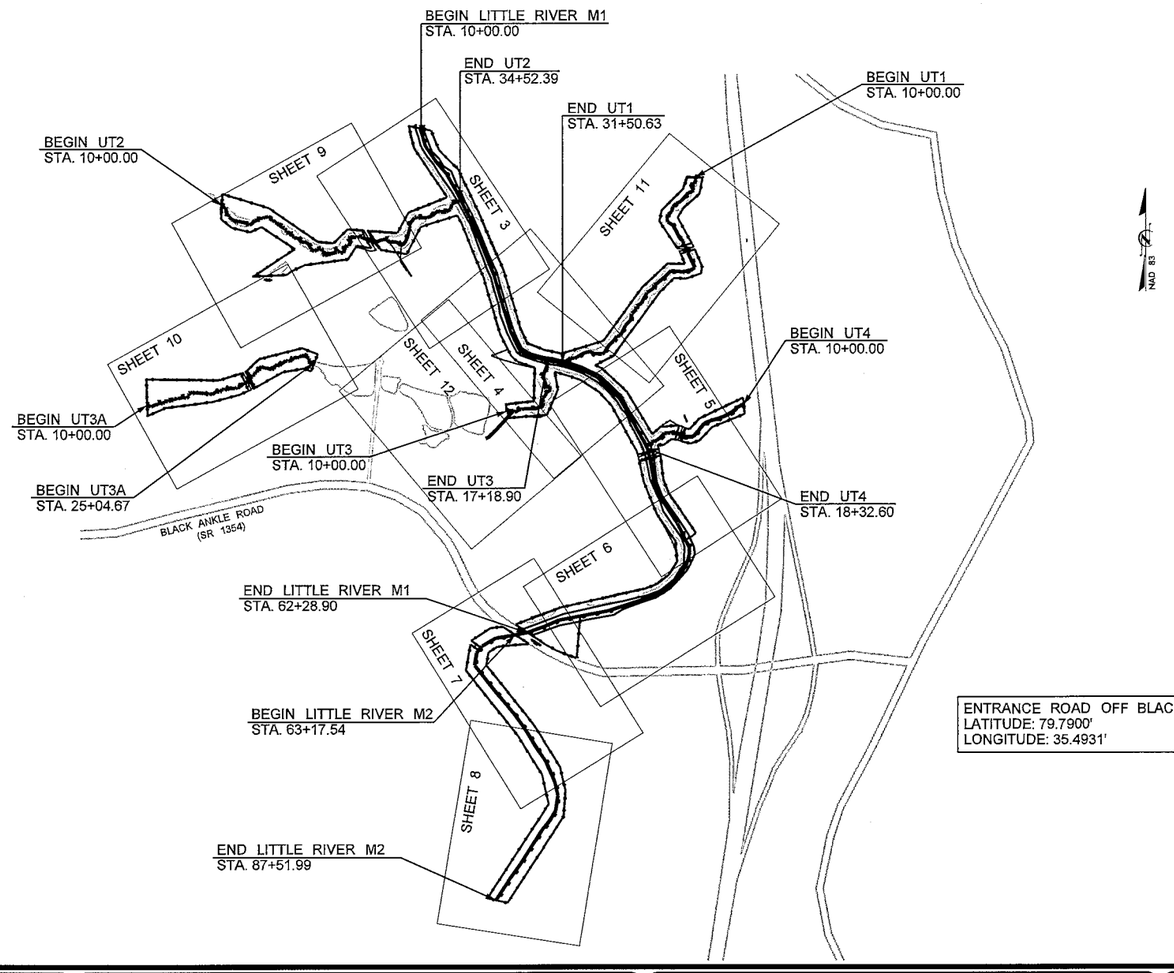
TYPE OF WORK: AS-BUILT FOR STREAM ENHANCEMENT, PRESERVATION, AND RESTORATION

PROJECT: 113115 LITTLE RIVER FARM



VICINITY MAP

INDEX OF SHEETS



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

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

5 0 5 10
PROFILE (VERTICAL)

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:

Ecosystem Enhancement PROGRAM

CONTACT: GUY PEARCE, PROJECT MANAGER

PREPARED IN THE OFFICE OF:

Baker
Michael Baker Engineering Inc.
8000 Regency Parkway
Suite 200
Cary, NORTH CAROLINA 27518
Phone: 919.463.8488
Fax: 919.463.5490

APRIL 2009
COMPLETION DATE:

KEVIN TWEEDY, PE
PROJECT ENGINEER

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN L. TWEEDY

10-20-09

SIGNATURE P.E.

2/26/03

STREAM CONVENTIONAL SYMBOLS

SUPERCEDES SHEET 1B

- ROCK J-HOOK
- ROCK VANE
- OUTLET PROTECTION
- ROCK CROSS VANE
- DOUBLE DROP ROCK CROSS VANE
- SINGLE WING DEFLECTOR
- DOUBLE WING DEFLECTOR
- TEMPORARY SILT CHECK
- ROOT WAD
- LOG J-HOOK
- LOG VANE
- LOG WEIR
- LOG CROSS VANE
- CONSTRUCTED RIFFLE
- BOULDER CLUSTER
- ROCK STEP POOL
- SAFETY FENCE
- TAPE FENCE
- 100 YEAR FLOOD PLAIN
- CONSERVATION EASEMENT
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- FOOT BRIDGE
- TEMPORARY STREAM CROSSING
- PERMANENT STREAM CROSSING
- TRANSPLANTED VEGETATION
- TREE REMOVAL
- TREE PROTECTION
- DITCH PLUG
- TRANSPLANTS
- CHANNEL FILL
- 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.	SHEET NO.
113115	1-A

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN L. TWEEDY

APPROVED BY:

10-20-09

DATE:

Baker
Michael Baker Engineering Inc.
8000 Regency Parkway
Suite 200
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490

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
Bare Root Trees Species			
Betula nigra	River Birch	5%	403
Carya ovata	Shagbark Hickory	10%	806
Celtis lavigata	Sugarberry	5%	403
Fraxinus pennsylvanica	Green Ash	5%	403
Liriodendron tulipifera	Tulip Poplar	5%	403
Nyssa salvatica	Black Gum	5%	403
Platanus occidentalis	Sycamore	5%	403
Quercus falcata var. *pagodifolia*	Southern Red Oak	10%	806
Quercus laurifolia	Laurel Oak	10%	806
Quercus michauxii	Swamp Chestnut Oak	15%	1,209
Quercus nigra	Water Oak	10%	806
Ulmus americana	American Elm	15%	1,209
Shrub Species			
Asimina triloba	Paw Paw	20%	644
Carpinus carolinanum	Ironwood	20%	644
Cornus amomum	Silky Dogwood	20%	644
Cornus florida	Flowering Dogwood	10%	322
Corylus cornuta	Hazelnut	15%	483
Lindera benzoin	Spicebush	15%	483

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

10/20/2009
R:\113115\Design\as-built\113115_psh_1a.dgn
MKeese

2/26/03

*S.U.E = SUBSURFACE UTILITY ENGINEER

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CONVENTIONAL SYMBOLS

ROADS & RELATED ITEMS

- Edge of Pavement
- Curb
- Prop. Slope Stakes Cut
- Prop. Slope Stakes Fill
- Prop. Woven Wire Fence
- Prop. Chain Link Fence
- Prop. Barbed Wire Fence
- Prop. Wheelchair Ramp
- Curb Cut for Future Wheelchair Ramp
- Exist. Guardrail
- Prop. Guardrail
- Equality Symbol
- Pavement Removal

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
- Prop. Temp. Construction Easement Line
- Prop. Temp. Drainage Easement Line
- Prop. Perm. Drainage Easement Line

HYDROLOGY

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

STRUCTURES

MAJOR

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

MINOR

- Head & End Wall
- Pipe Culvert
- Footbridge
- Drainage Boxes
- 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

- Recorded Water Line
- Designated Water Line (S.U.E.*)
- Sanitary Sewer
- Recorded Sanitary Sewer Force Main
- Designated Sanitary Sewer Force Main(S.U.E.*)
- Recorded Gas Line
- Designated Gas Line (S.U.E.*)
- Storm Sewer
- Recorded Power Line
- Designated Power Line (S.U.E.*)
- Recorded Telephone Cable
- Designated Telephone Cable (S.U.E.*)
- Recorded U/G Telephone Conduit
- Designated U/G Telephone Conduit (S.U.E.*)
- Unknown Utility (S.U.E.*)
- Recorded Television Cable
- Designated Television Cable (S.U.E.*)
- Recorded Fiber Optics Cable
- Designated Fiber Optics Cable (S.U.E.*)
- Exist. Water Meter
- U/G Test Hole (S.U.E.*)
- Abandoned According to U/G Record
- End of Information

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
- Parcel Number
- Fence Line
- Existing Wetland Boundaries
- High Quality Wetland Boundary
- Medium Quality Wetland Boundaries
- Low Quality Wetland Boundaries
- Proposed Wetland Boundaries
- Existing Endangered Animal Boundaries
- Existing Endangered Plant Boundaries

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
- Guard Post
- 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

2/26/03

PROJECT REFERENCE NO.	SHEET NO.
113115	2

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN L. TWEEDY

APPROVED BY:

10-20-09

DATE:

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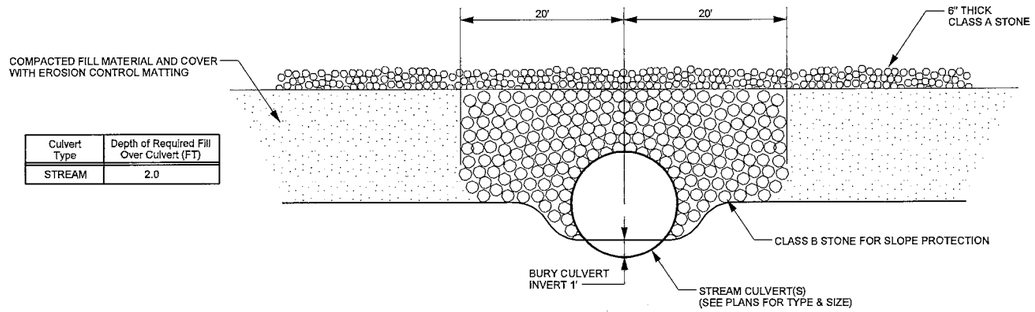
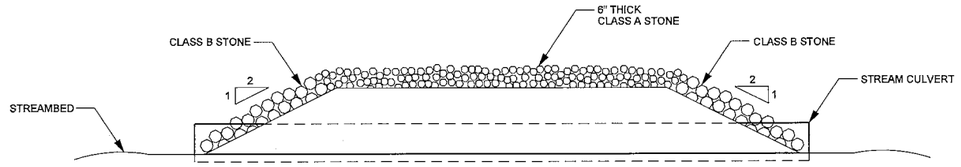
PERMANENT ROAD CULVERT CROSSING



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

PROFILE VIEW ALONG ROAD

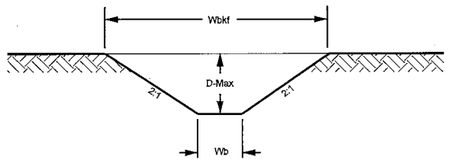


CROSS SECTION

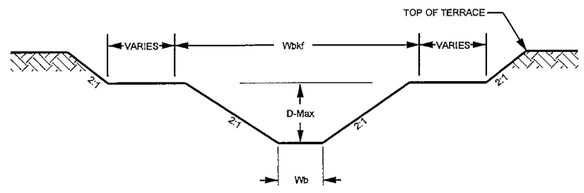
NOTES:

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

NOTES:

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

UT4		
RIFFLE	POOL	
6.5	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)

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2/26/09

PROJECT REFERENCE NO.	SHEET NO.
113115	2-A

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN I. TWEEDY

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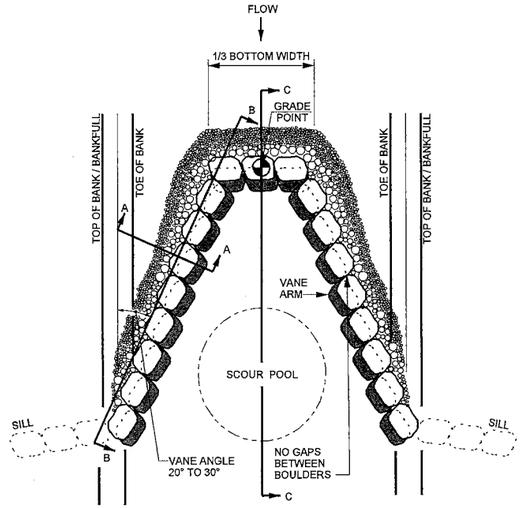
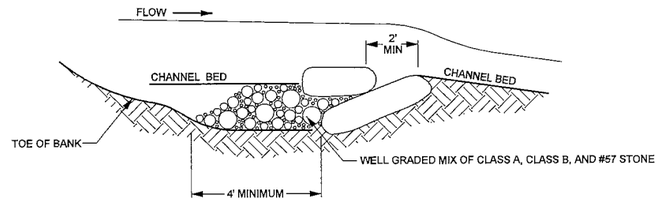
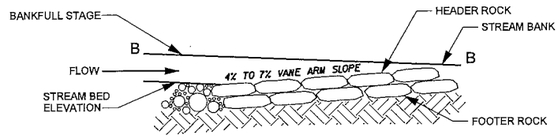
ROCK CROSS VANE

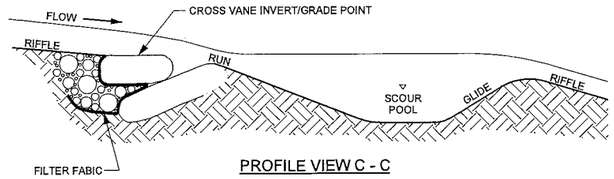




SECTION A - A



PROFILE VIEW B - B
VANE ARM

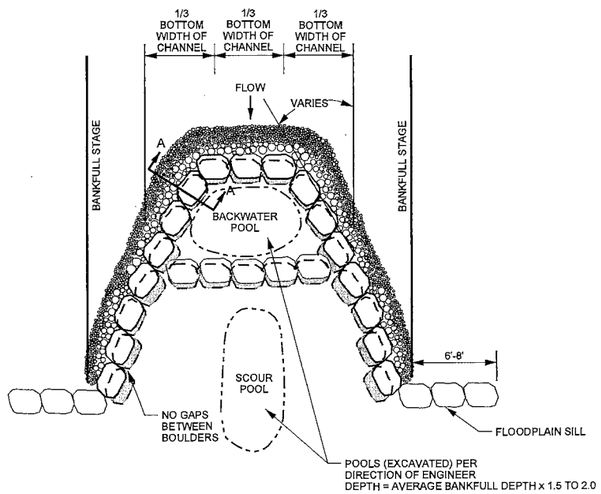


PROFILE VIEW C - C

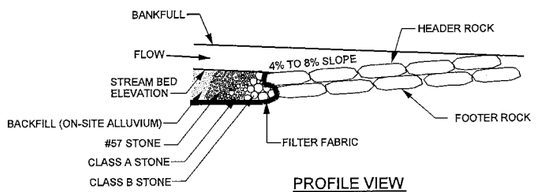
NOTES FOR ALL VANE STRUCTURES:

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.

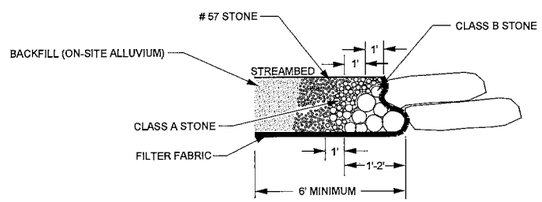
DOUBLE DROP ROCK CROSS VANE



PLAN VIEW



PROFILE VIEW



SECTION A - A

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

PROJECT REFERENCE NO.	SHEET NO.
113115	2-B

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN L. TWEEDY

APPROVED BY:

10-20-09

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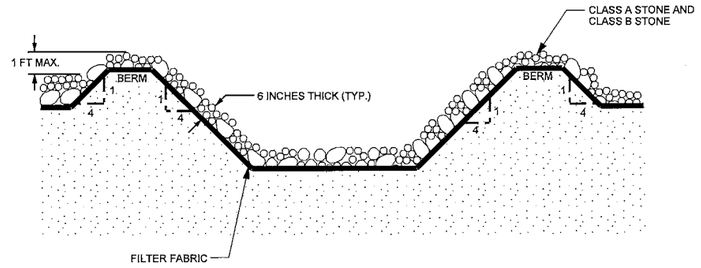
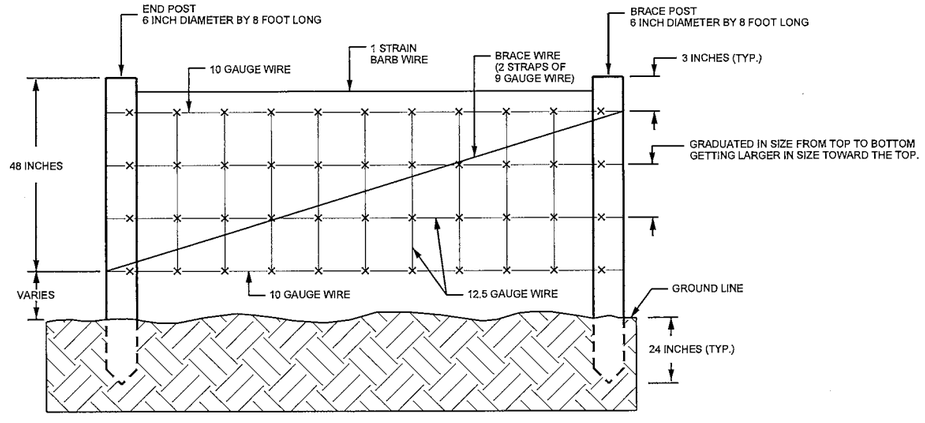
PERMANENT FORD STREAM CROSSING



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.

WOVEN FIELD FENCE



NOTE:

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

10/20/2009
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PROJECT REFERENCE NO.	SHEET NO.
113115	3

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN I. TWEEDY

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10-20-09

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END UT2
STA. 34+52.39

BEGIN LITTLE RIVER M1
STA. 10+00.00

VEG PLOT #4

VEG PLOT #13

VEG PLOT #14

UT2 CROSSING PHOTO POINT

SLOPED, SEEDED, MATTED BANK, AND APPLIED LIVE STAKES

MATCHLINE SHEET 4 LITTLE RIVER STA. 22+00.00

MATCHLINE SHEET 9 UT2 STA. 26+50.00

NAD 83

BUFFER PLANTING ZONE

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

LITTLE RIVER FARM PLAN VIEW

50 25 0 50 100
SCALE (FT)

10/20/2009
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PROJECT REFERENCE NO.	SHEET NO.
113115	4

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN I. TWEEDY

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NAD 83

MATCHLINE SHEET 11 UT1 STA. 27+00.00

MATCHLINE SHEET 3 LITTLE RIVER STA. 22+00.00

MATCHLINE SHEET 5 LITTLE RIVER STA. 36+00.00

VEG PLOT #7

VEG PLOT #3

VEG PLOT #9

END UT1
STA. 31+50.63

END UT3
STA. 17+18.90

BEGIN UT3
STA. 10+00.00

MATCHLINE SHEET 12

REGRADED GULLY TO A 10' BOTTOM WIDTH WITH 3:1 SIDE SLOPES, APPLIED EROSION CONTROL MATTING AND SEEDING ALONG BOTTOM AND SIDE SLOPES.

BUFFER PLANTING ZONE

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

LITTLE RIVER FARM PLAN VIEW

50 25 0 50 100
SCALE (FT)

2/26/03

10/20/2009
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2/26/03

PROJECT REFERENCE NO.	SHEET NO.
113115	5

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN L. TWEEDY

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BEGIN UT4
STA. 10+00.00

PHOTO POINT #1

PHOTO POINT #2

PHOTO POINT #3

PHOTO POINT #4

PHOTO POINT #5

PHOTO POINT #6

PHOTO POINT #7

PHOTO POINT #8

PHOTO POINT #9

PHOTO POINT #10

PHOTO POINT #11

CROSS SECTION 1
RIFFLE
STA. 11+35.00

CROSS SECTION 2
POOL
STA. 13+33.00

CREST GAUGE

INSTALLED 16' GATE

INSTALLED 16' GATE

INSTALLED 16' GATE

INSTALLED 16' GATE

UT4 CROSSING
PHOTO POINT

REMOVED CONCRETE CROSSING AND
INSTALLED PERMANENT FORD CROSSING

VEG PLOT #6

VEG PLOT #5

VEG PLOT #2

END UT4
STA. 18+82.00

MATCHLINE SHEET 4 LITTLE RIVER STA. 36+00.00

MATCHLINE SHEET 6 LITTLE RIVER STA. 47+00.00

NAD 83

BUFFER PLANTING ZONE

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

LITTLE RIVER FARM
PLAN VIEW

50 25 0 50 100
SCALE (FT)

10/20/2009
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2/26/03

BUCK PROJECT REFERENCE NO.	SHEET NO.
113115	6

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER ERIN L. TWEEDY

APPROVED BY:

10-20-09

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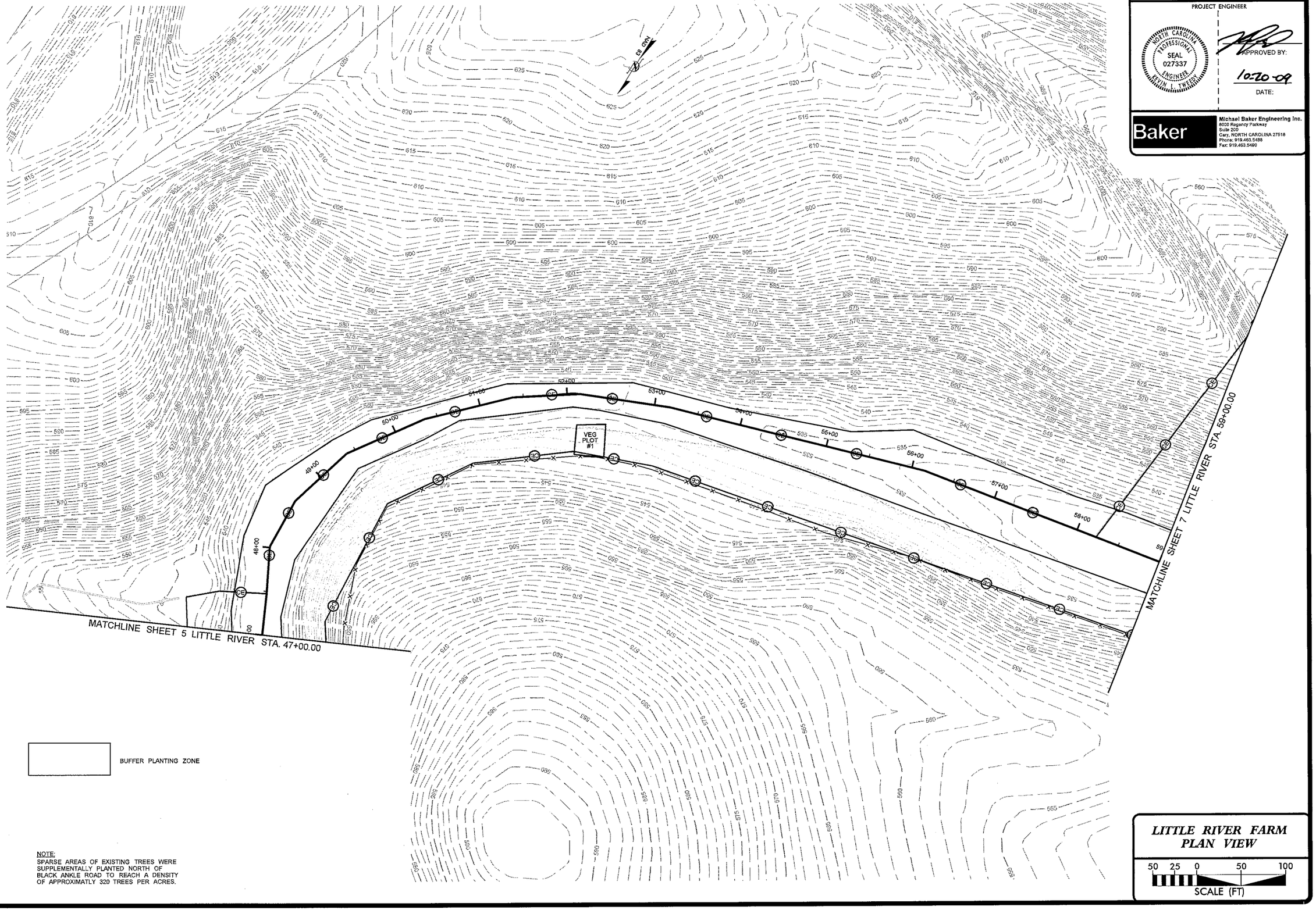

NOTE:
SPARSE AREAS OF EXISTING TREES WERE SUPPLEMENTALLY PLANTED NORTH OF BLACK ANKLE ROAD TO REACH A DENSITY OF APPROXIMATLY 320 TREES PER ACRES.

LITTLE RIVER FARM PLAN VIEW

50 25 0 50 100
SCALE (FT)

10/20/2009
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PROJECT REFERENCE NO.	SHEET NO.
113115	7

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN L. TWEDDY

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NAD 83

MATCHLINE SHEET 6 LITTLE RIVER STA. 59+00.00

END LITTLE RIVER M1
STA. 62+28.90

BLACK ANKLE ROAD
SR 1354

BEGIN LITTLE RIVER M2
STA. 63+17.54

NO CONSTRUCTION OR PLANTING ACTIVITIES OCCURRED ON LITTLE RIVER REACH M2

EXCLUDED AREA FROM EASEMENT FOR MARTIN MARIETTA

MATCHLINE SHEET 8 LITTLE RIVER STA. 76+50.00

BUFFER PLANTING ZONE

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

LITTLE RIVER FARM
PLAN VIEW

50 25 0 50 100
SCALE (FT)

10/20/2009
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PROJECT REFERENCE NO.	SHEET NO.
113115	8

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN L. TWEDT

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MATCHLINE SHEET 7 LITTLE RIVER STA. 76+50.00

NO CONSTRUCTION OR PLANTING ACTIVITIES OCCURRED ON LITTLE RIVER REACH M2

END LITTLE RIVER M2
STA. 87+51.99

NAD 83

LITTLE RIVER FARM
PLAN VIEW

50 25 0 50 100
SCALE (FT)

2/26/03

10/20/2009
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PROJECT REFERENCE NO.	SHEET NO.
113115	9

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN L. TWEDY

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BEGIN UT2
STA. 10+00.00

VEG PLOT #17

VEG PLOT #16

VEG PLOT #15

EPHEMERAL TRIBUTARY

UT2A CROSSING PHOTO POINT

INSTALLED PERMANENT FORD CROSSING

INSTALLED 16' GATE

IMPROVED 30" RCP CULVERT CROSSING BY CLEARING DEBRIS AND ADDING ADDITIONAL CLASS B STONE TO SIDE SLOPES

INSTALLED 16' GATE

MATCHLINE SHEET 3 UT2 STA. 26+50.00

NAD 83

BUFFER PLANTING ZONE

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

LITTLE RIVER FARM
PLAN VIEW

50 25 0 50 100
SCALE (FT)

2/26/03

10/20/2009
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2/26/03

PROJECT REFERENCE NO.	SHEET NO.
113115	10

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN L. TWEEDY

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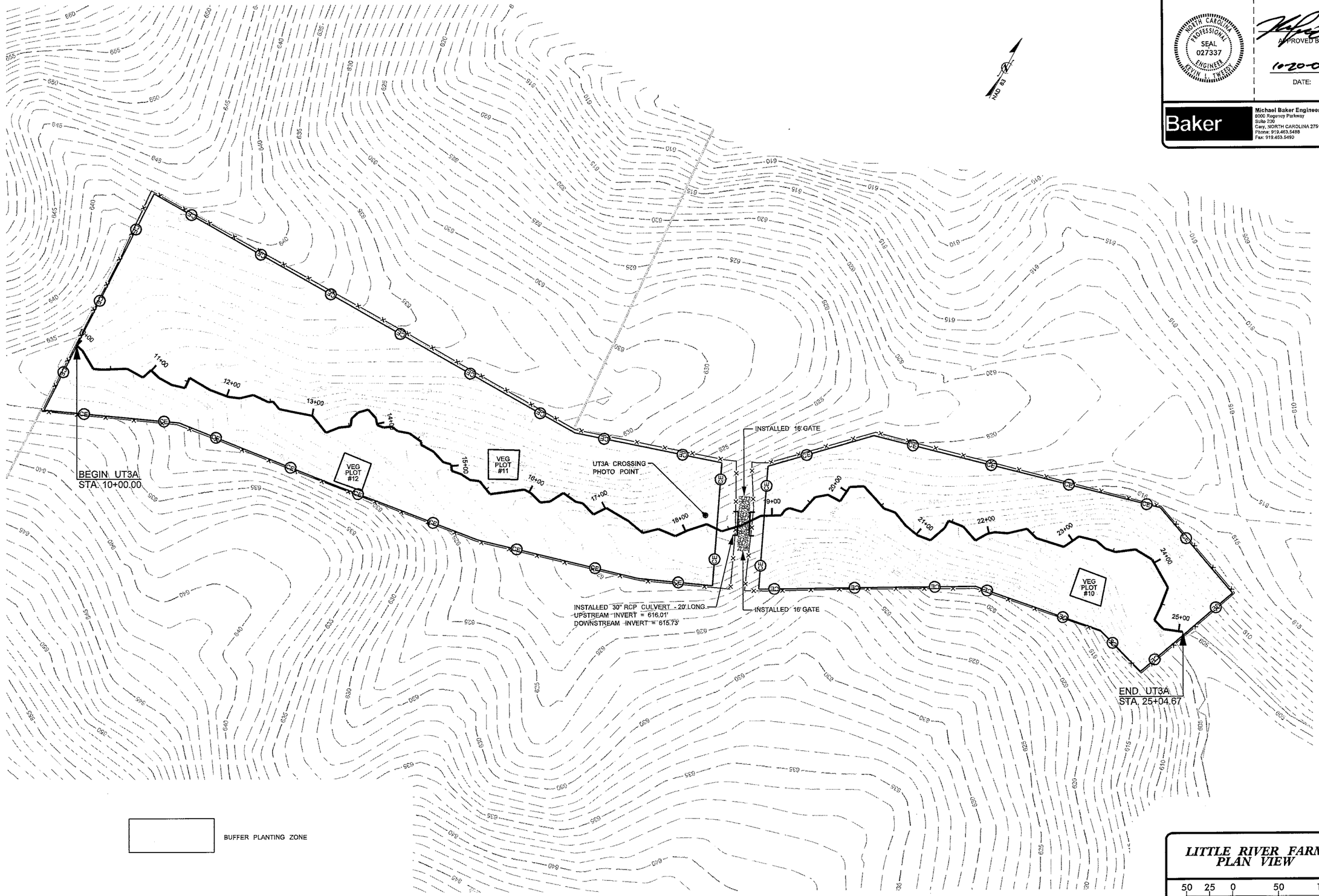

LITTLE RIVER FARM
PLAN VIEW

50 25 0 50 100
SCALE (FT)

10/20/2009
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PROJECT REFERENCE NO.	SHEET NO.
113115	11

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN L. TWEEDY

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2/26/03

US ROUTE 220

INSET A

DETENTION BASIN

18+00

19+00

20+00

21+00

22+00

23+00

24+00

25+00

26+00

MATCHLINE SHEET 4 UT1 STA. 27+00.00

INSTALLED 60" RCP CULVERT = 20' LONG
UPSTREAM INVERT = 563.85'
DOWNSTREAM INVERT = 563.42'

INSTALLED 16' GATE

UT1 CROSSING
PHOTO POINT

INSTALLED 16' GATE

VEG PLOT #8

16+00

15+00

14+00

13+00

12+00

11+00

10+00

VEG PLOT #7

BEGIN UT1
STA. 10+00.00

BUFFER PLANTING ZONE

INSET A

FLOW

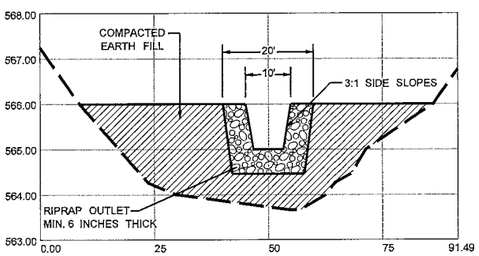
DETENTION BASIN

A

A'

RIPRAP OUTLET
ELEV. = 565.0'
TIED RIPRAP OUTLET
INTO BEDROCK
ALONG STREAMBANK

COMPACTED EARTH FILL
MINIMUM 3:1 SLOPES



SECTION A-A'

LITTLE RIVER FARM
PLAN VIEW

50 25 0 50 100
SCALE (FT)

10/20/2009
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2/26/03

PROJECT REFERENCE NO.	SHEET NO.
113115	12

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN L. TWEDDY

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NAD 83

MATCHLINE SHEET 4

REGRADED GULLY TO A 10' BOTTOM WIDTH WITH 3:1 SIDE SLOPES. APPLIED EROSION CONTROL MATTING AND SEEDING ALONG BOTTOM AND SIDE SLOPES.

LAGOON

LAGOON

LITTLE RIVER FARM
PLAN VIEW

50 25 0 50 100
SCALE (FT)

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 – 9/14/2012

Wildlife Photo

9/13/2012