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

Final Year 4 Monitoring Report (2013)

Montgomery County, North Carolina

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Table of Contents

Appendices

List of Tables

List of Charts

1.0 EXECUTIVE SUMMARY

This Annual Report details the monitoring activities during the 2013 growing season at the Little River Farm Site. Construction of the site, including the planting of native woody and herbaceous vegetation and 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 2013 data represents results from the fourth year of vegetation, geomorphic, 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 at the site consisted 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 the Little River was restored, 11,029 LF of stream was enhanced, and 2,409 LF of stream was preserved along the Little River and its four UTs (UT1, UT2, UT3, and UT4). In addition, 1,076 LF of the 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 at the site, while a conservation easement consisting of 44.5 AC was recorded 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. Additional floodplain plantings were implemented in 2013 to ensure that the project would meet its final success criteria. The Year 4 vegetation monitoring indicated a survival range of 445 stems per acre to 728 stems per acre, with an overall average of 550 stems per acre. Based on these results, this site, in general, is on track to meet its final success criteria of an average of 260 stems per acre at the end of monitoring Year 5. Chinese privet (*Ligustrum sinese*) has been noted throughout the enhancement areas on the mainstem of the Little River and predominantly at the downstream extents of its UTs.

In general, the majority of the project's dimension, pattern, profile, and in-stream structures remained stable during the fourth growing season. A geo-lift and brush mattresses were installed in 2013, along UT4, to address areas of bank erosion noted from Year 3 Monitoring and to increase stability in areas where stream bank vegetation was poorly established. No instability was noted along the restored area of UT4, during Year 4 Monitoring. Erosion and stability issues were noted on the crossings of UT2, UT2A, and UT3A. Two bankfull events were documented during 2013.

2.0 PROJECT GOALS, BACKGROUND, & ATTRIBUTES

2.1 Project Location and Description

The Little River Farm Site (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 located in the Yadkin River Basin and 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 at the 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 the 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).

The Little River, at the downstream extent of the site, drains approximately 51 square miles of predominately agricultural lands, while each of its tributaries, within the project boundaries, drain less than one square mile. The 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 the Little River, while UT2 and UT3 flow northeast to the 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 58). 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 vegetation along the 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 along 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 the Little River and its UTs, was recorded and is permanently protected 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 the 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 the Little River, UT1, UT2 UT3, and UT4 into seven reaches (as-built plan sheets, Appendix D). The Little River flows from north to south entering the site at the northern property line. The 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 the Little River. UT2 flows west to east starting along the western edge of the property and ending at its confluence with the 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 the 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 the 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 contributing 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 restoration at this portion of the property had not been procured. Additional funding was later received from the NC Division of Water Resources (DWR) to decommission and remove the lagoons and restore the stream. At the submittal of the Year 2 Monitoring Report, the lagoons had been removed, construction was complete, and a conservation easement has been established on the restored section of stream which connects UT3A and UT3. The conservation easement within this portion of the site is being held in perpetuity by the State of North Carolina.

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 appropriate 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 permanently 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.

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 Comme	nt
UT2	2,402	E	EII	2,371	1:2.5	948	10+00 to 25+37 26+18 to 34+52	Two unstable meander bends were sloped and stabilized. A 50-foot planted buffer was placed within a conservation easement. Cattle were excluded from the conservation easement by fencing. The existing farm crossing (outside the easement) was stabilized.
UT3A	1,455	E	EII	1,449	1:2.5	580	10+00 to 18+36 18+92 to 25+05	A 50-foot planted buffer was placed within a conservation easement. Cattle were excluded from the conservation easement by fencing. The existing farm crossing (outside the easement) was stabilized.
UT3	719	E	EII	719	1:2.5	288	10+00 to 17+19	A 50-foot planted buffer was placed within a conservation easement. Cattle were excluded from the conservation easement by fencing.
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	Dec-13	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: Scott Hunt, Tel. 919-481-5703
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 at 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 (crest gauge and photographs), 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 at 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, UT2A, UT3A, UT3, UT4 and the Little River (M1). The size of individual quadrants is 100 square meters for woody tree species. Vegetation monitoring will occur in the fall, prior to the loss of leaves. Individual quadrant data will be provided and will include diameter, height, density, and coverage quantities. Relative values will be calculated, and importance values will be determined. Individual seedlings will be marked such that they can be found in succeeding monitoring years. Mortality will be determined from the difference between the previous year's living, planted seedlings and the current year's living, planted seedlings.

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

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

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

3.3 Maintenance and Contingency Plan

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

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

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

4.0 MONITORING RESULTS – 2013 YEAR 4 - 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

Fourth year monitoring dimension and profile data of UT4 were surveyed in September 2013. Results from the fourth 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 in September 2013. The cross-section dimension results document that UT4 has experienced little to no change in geometry within the last year. Portions of the floodplain bench and side slopes along UT4 were regraded and reseeded during Year 2, which resulted in slight narrowing of the floodplain bench at both cross-sections and has continued to remain consistent with the results from Year 4.

Longitudinal Profile

A longitudinal profile was resurveyed along the entire reach (515 LF) of UT4 in September 2013. 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 resembles the results from the as-built survey. Riffle slopes have flattened slightly in comparison to as-built values.

Channel work appears to have re-stabilized riffles previously experiencing minor degradation. When compared to the as-built profile data, pools continue to appear slightly aggraded. However, this aggradation has not worsened, but seems to have lessened within the past year and is most likely a result from wetter spring and summer conditions which increased channel flows and allowed the channel to transport sediment through the system as designed.

Year 4 survey and field assessment has shown that maintenance work conducted in early 2013 to re-stabilize areas of minor instability along UT4, was successful even during periods of extreme weather fluctuations.

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

In late winter of 2013, a geolift and several brush mattresses were installed along UT4 to address areas of bank erosion noted from Year 3 Monitoring and to increase stability in areas where stream bank vegetation was poorly established. In addition, a rock step was installed at station 12+25 to dissipate flow velocities and minimize downstream erosion. During Year 4 Monitoring, maintenance areas, as well as, the original constructed sections were functioning as intended and no additional

areas of instability were noted. Minor erosion and stability issues were noted on the crossings of UT2, UT2A, and UT3A.

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%	100%	
B. Pools	100%	100%	100%	60%	100%	
C. Thalweg	100%	100%	100%	100%	100%	
D. Meanders	100%	100%	100%	100%	100%	
E. Bed General	100%	100%	100%	100%	100%	
F. Bank Condition	100%	100%	84%	82%	100%	
G. Vanes / J Hooks etc.	100%	100%	100%	89%	100%	
H. Wads and Boulders	100%	99%	100%	89%	100%	

4.2 Hydrology Data

The on-site crest gauge documented the occurrence of two bankfull events during the fourth year monitoring period. The highest stage recorded during the fourth year monitoring period was 0.33 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	12/11/2013	Between 9/14/2012 and 12/11/2013	Crest Gauge	0.33	UT4 CG-1
UT4	12/18/2013	Between 12/11/2013 and 12/18/2013	Crest Gauge	0.16	UT4 CG-2

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 4 monitoring period. Year 4 monitoring data recorded from the 17 vegetation plots documented a range of 445 to 728 planted stems per acre with an average density of planted bare root stems of 550 stems per acre. Volunteer species were noted in Plots 1, 4, 9, 12, 15, 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, is on track to meet its final success criteria of an average of 260 stems per acre at the end of monitoring Year 5.

Supplemental stems were planted along portions of the 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 were installed along the Little River M1, UT1, and UT4 reaches near Vegetation Plots 3, 4, 6, 7, and 8 to improve woody vegetation counts to densities within the conservation easement that will meet and/or exceed project goals and 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

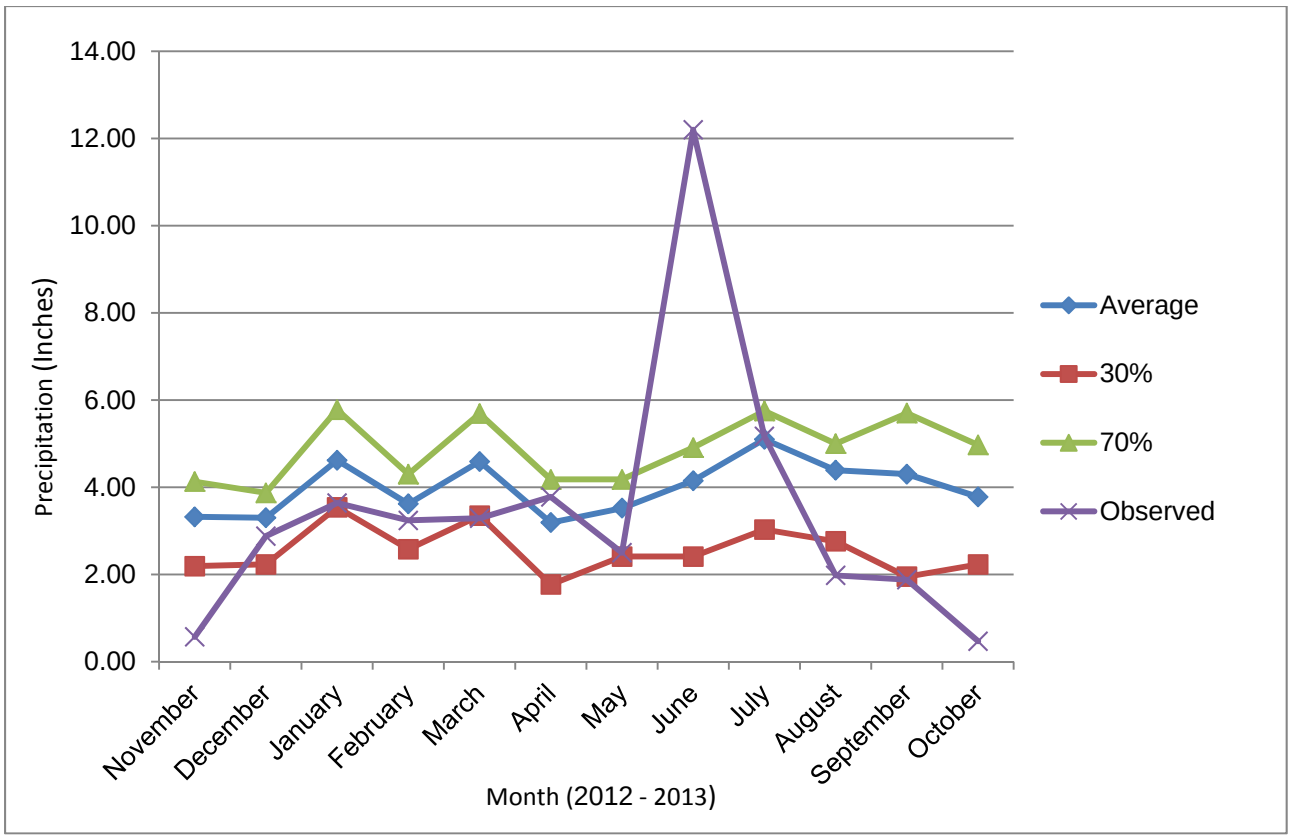
The site experienced drier than normal conditions from November 2012 through March 2013 with recorded precipitation approximately 6 inches below the historic average. As during Year 3 Monitoring, precipitation varied greatly throughout the growing season, with over 12 inches in the month of June. Rainfall in inches was comparable to average rates for April and July, while, May, August, September, and October recorded precipitation rates significantly drier than average. 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. However the more consistent rainfall in the late spring and early summer of Year 4, helped to alleviate previous drought conditions and aided in establishment and growth of riparian plantings.

Table 7. Comparison of Historic Rainfall to Observed Rainfall				
Little River Creek Farm Site : Project No. 000623				
Month	**Average (inches)**	**30% (inches)**	**70% (inches)**	**Observed 2012 - 2013 Precipitation* (inches)**
November	3.32	2.19	4.13	0.57
December	3.30	2.23	3.87	2.88
January	4.61	3.54	5.78	3.64
February	3.60	2.58	4.30	3.24
March	4.59	3.35	5.69	3.29
April	3.19	1.77	4.18	3.78
May	3.52	2.41	4.18	2.50
June	4.15	2.41	4.91	12.20
July	5.10	3.03	5.75	5.17
August	4.39	2.76	5.00	1.98
September	4.30	1.95	5.70	1.88
October	3.78	2.23	4.97	0.47

NRCS National Climate and Water Center, 2000 and USGS, 2012-13
* Monthly on-site rainfall data unavailable, so total monthly rainfall data was calculated using the nearest USGS rain gauge
(USGS 351943080323145 rain gage at Rocky River WWTP, Concord, NC) to the project site. (USGS 2012 & 2013)

Chart 1. Comparison of Historic Rainfall to Observed 2012-2013 Rainfall



4.3.2 Vegetation Plot Problems

Vegetation plot counts were conducted in November 2013. During this assessment, planted woody stems previously noted to be hand-cut in various plots throughout the project area have been re-evaluated and indicate beaver activity. Though additional beaver activity was noted during Year 4 monitoring in vegetation plots 2, 10, 12, and 16, the damage, as in previous years, has not resulted in significant losses of vegetation. Many previously damaged stems have resprouted and are showing good indicators of growth and are likely to flourish. Areas, where invasive species were noted to be of concern in Year 3, were treated with an herbicidal spot treatment application during 2013. Additionally, in areas where Chinese privet had become established, the physical removal of invasives was used. Some regrowth of invasives in the treated areas were noted during Year 4. Therefore, in order to prevent these species from becoming reestablished, an additional herbicidal spot treatment application may be necessary in subsequent monitoring years. See Figures C1a and C1b in Appendix C for the location of the vegetation plot problem areas.

4.3.3 Vegetation Problem Areas

During monitoring years one through three, bare areas and erosion rills were present along the floodplain bench and side slopes of UT4. Though the areas were regraded and reseeded on multiple occasions, the lack of significant rainfall during the growing seasons continued to inhibit the establishment of herbaceous cover throughout the reach. In late winter of 2013 several brush mattresses were installed along UT4 to address areas of bank erosion that were noted during Year 3 Monitoring and were most likely the result of poorly establish streambank vegetation.

In areas along the Little River, UT1, UT2, and UT3 invasive species were noted to be of concern in Year 3. These areas were treated with an herbicidal spot treatment application or physically removed during 2013. Because some regrowth of invasives in the treated areas and additional areas of concern were noted during Year 4 additional invasive removal implementation measures will be conducted prior to Year 5 Monitoring.

Areas of low vegetation density, previously noted along UT4 and within isolated sections of the floodplain along the mainstem of the Little River, were supplemented with 3-gallon container plantings during the dormant season in early 2013. Once the newly planted woody riparian vegetation becomes established, a dense riparian tree canopy will also be established; therefore, minimizing fescue migration in the riparian corridor from adjacent pastures, as well as, shading out other invasives such as Chinese privet, multi-flora rose, and morning glory.

Beaver activities were also noted in small pockets primarily along UT2A, UT3A, and on the main stem of the Little River, just downstream the farm crossing.

See Table C.6 in Appendix C for problem area categories, locations, descriptions, causes, and photo log. See Figures 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 and C1b in Appendix C for an overview of vegetative problem areas.

4.4 Areas of Concern

The establishment of Chinese privet continues to be an area of concern within project's enhancement reaches, along the Little River and at its confluences with its tributaries. In addition, beaver activity continues to be present within isolated areas of the floodplain. Though the activity in the form of tree cutting is apparent, the intention of the activity is not apparent because the timbered woody vegetation is left in the floodplain and no beaver dens or dams have been located within the project extents. As discussed in previous sections, removal and herbicidal treatment of invasives will be conducted in early 2014. Beaver activity will also continue to be

monitored. Removal of beavers will be conducted if the physical presence of their habitat is located. See Figures C1a and C1b in Appendix C for an overview of noted beaver activity locations.

5.0 References

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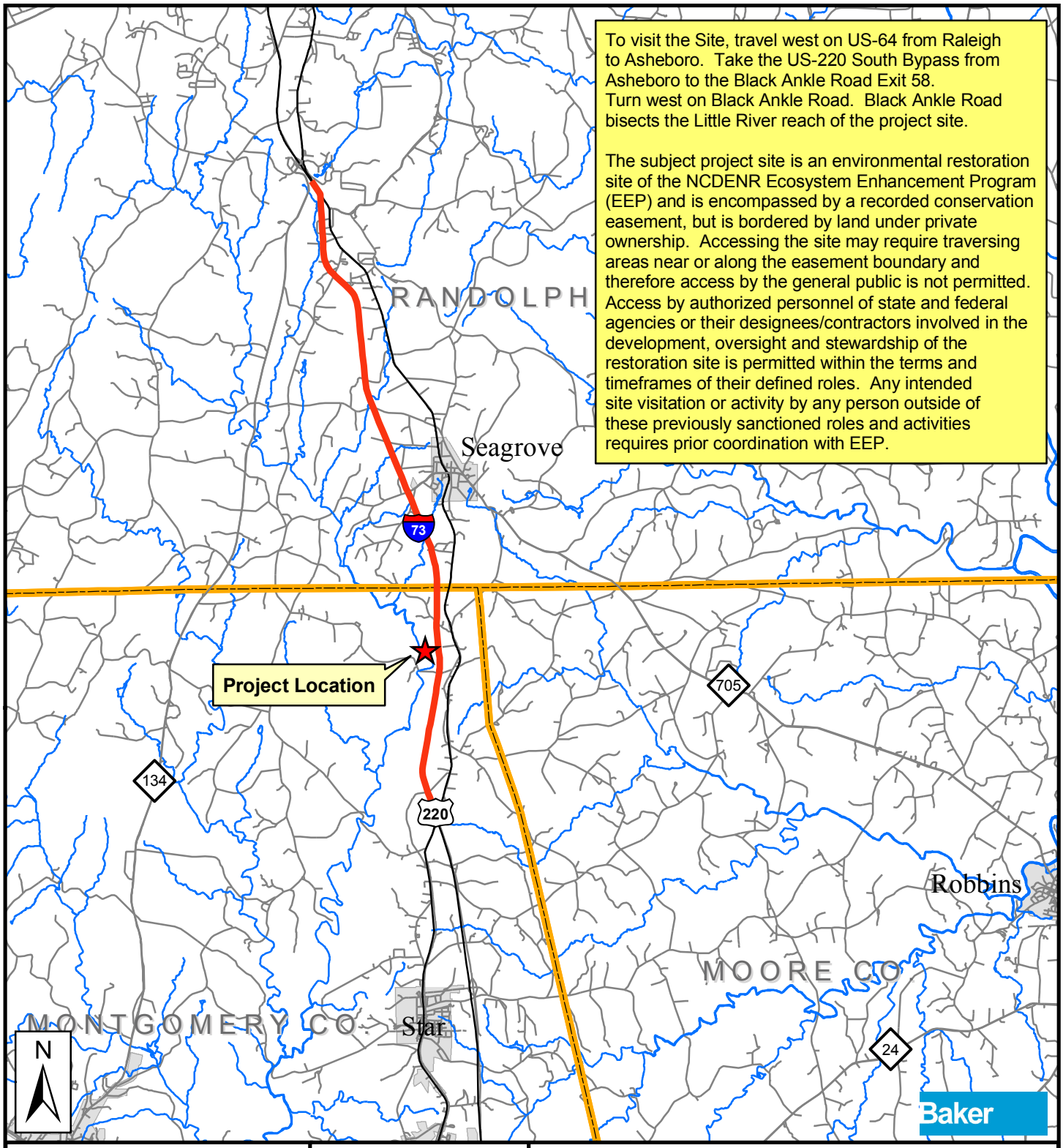
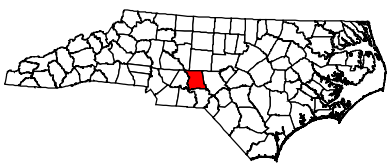
APPENDIX A:
FIGURES



Map Vicinity



Montgomery County, NC

Ecosystem Enhancement PROGRAM

EEP Project No.: 000623

January 2014

Figure 1. Project Vicinity Map

Little River Farm Site - Year 4 Monitoring

Montgomery County, NC

LEGEND

Location

County Boundaries

0 1.25 2.5 Miles

1 inch = 2.5 miles

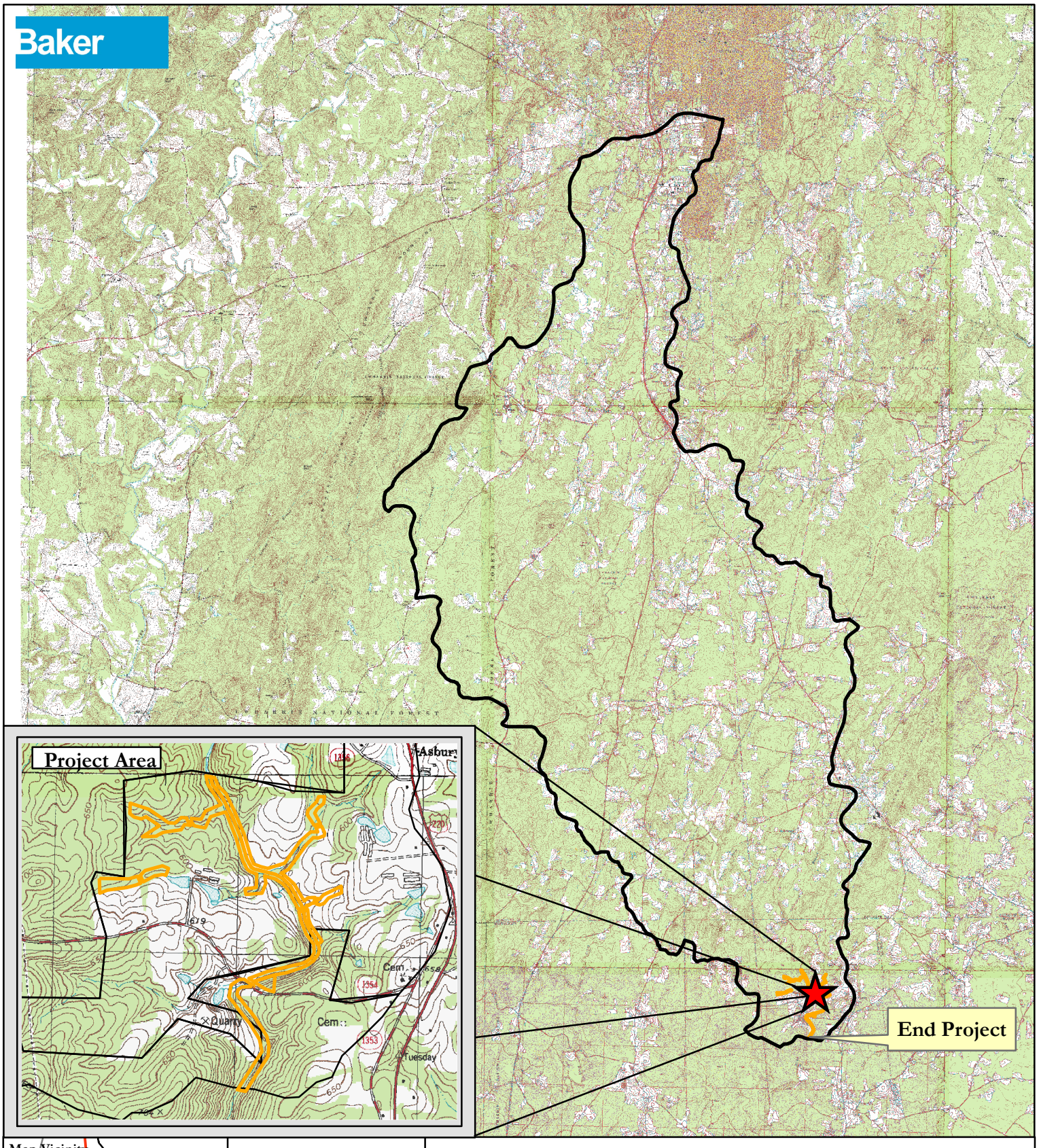
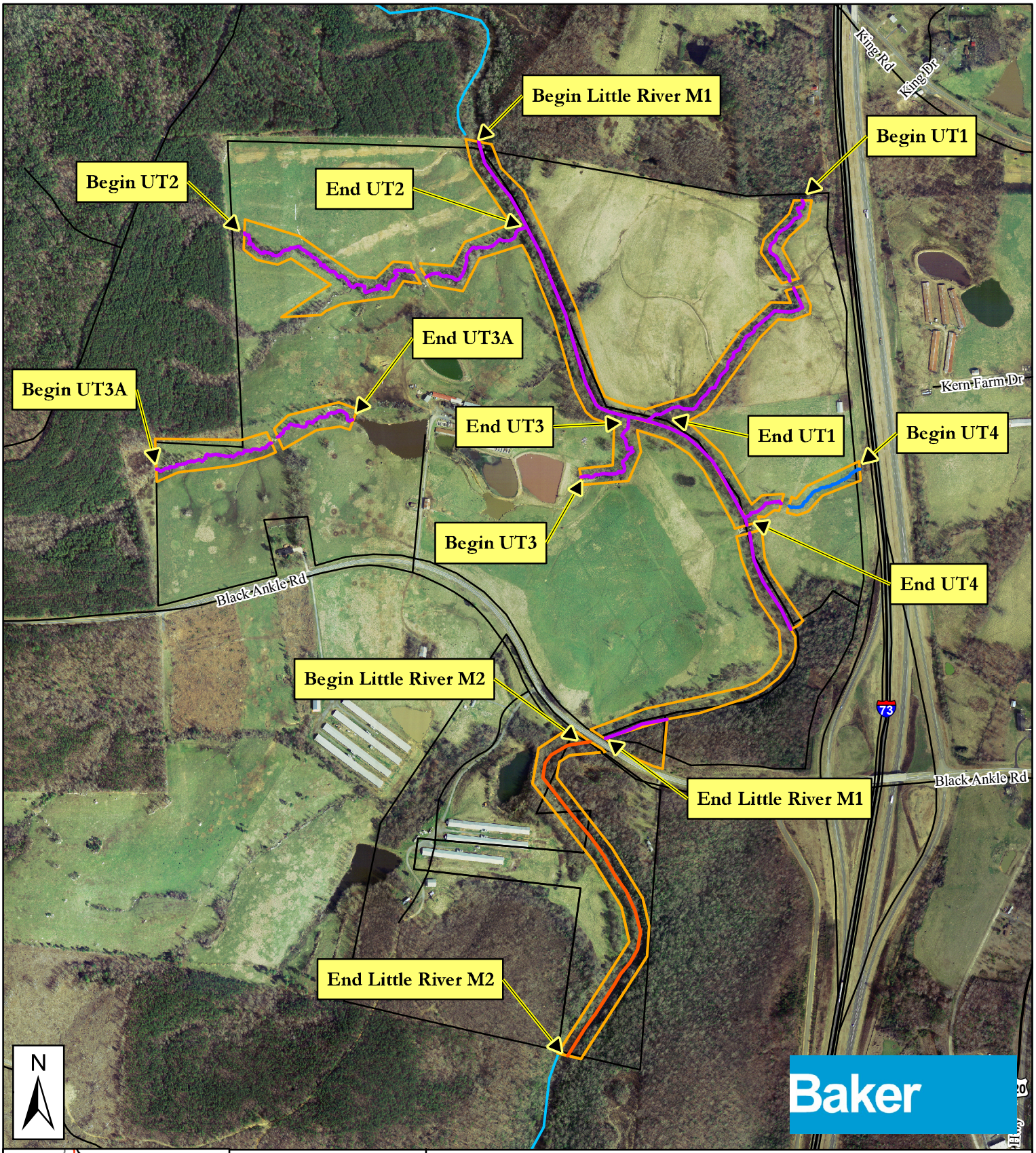
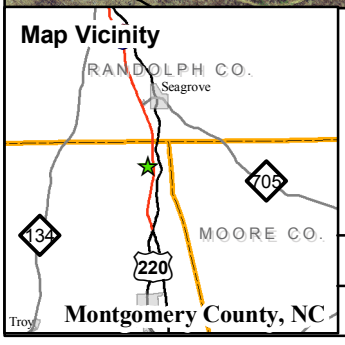


Figure 2. USGS Topographic & Watershed Map

Little River Farm Site - Year 4 Monitoring

Montgomery County, NC





Ecosystem Enhancement Program

EEP Project No.: 000623

January 2014

Figure 3. Project Summary Map

Little River Farm Site - Year 4 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

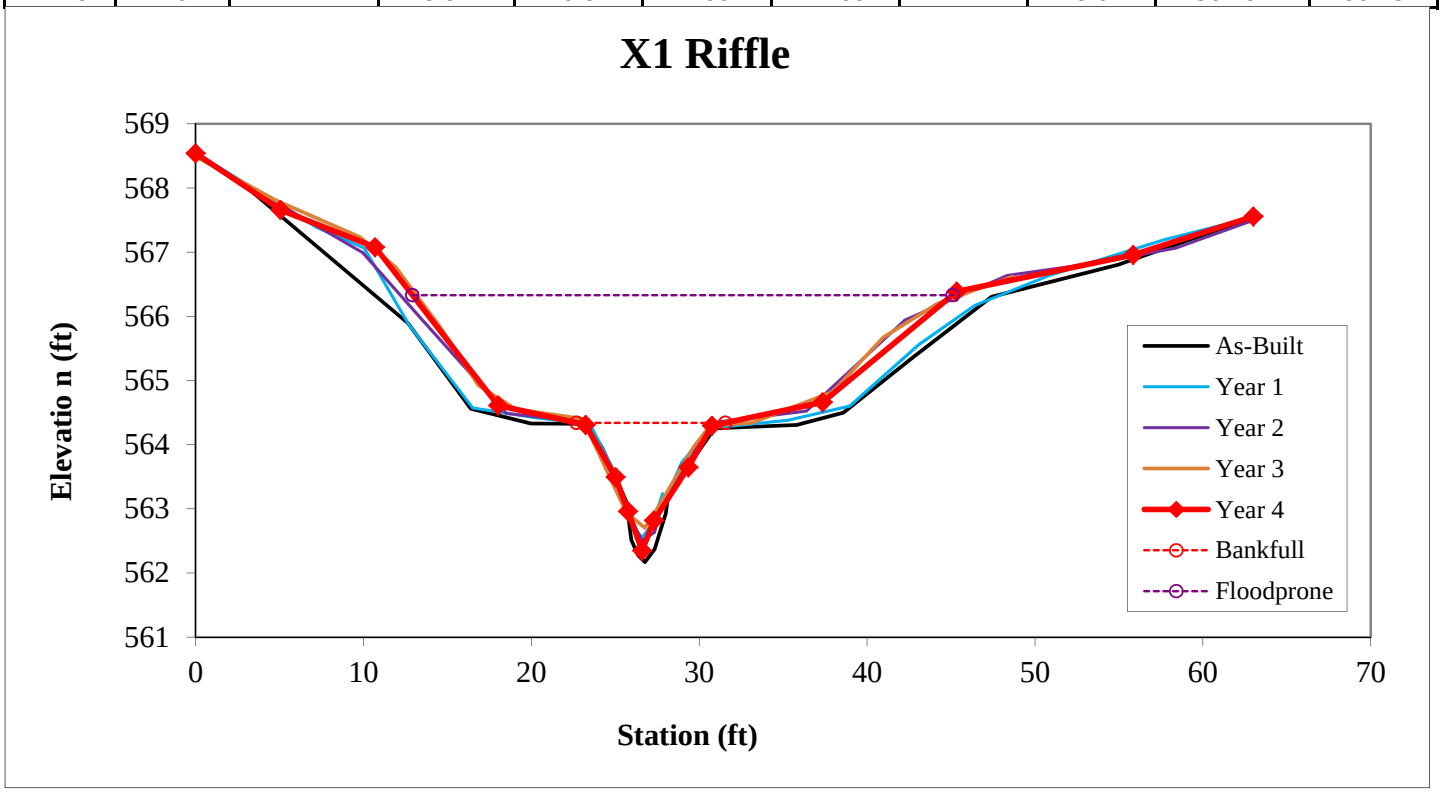
Little River Farm Site: Project No. 000623

(Year 4 Monitoring Data - Collected September 2013)

Left Bank

Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	Eb	7.1	8.87	0.8	1.99	11.09	1	3.6	564.34	564.3



Permanent Cross-section X2

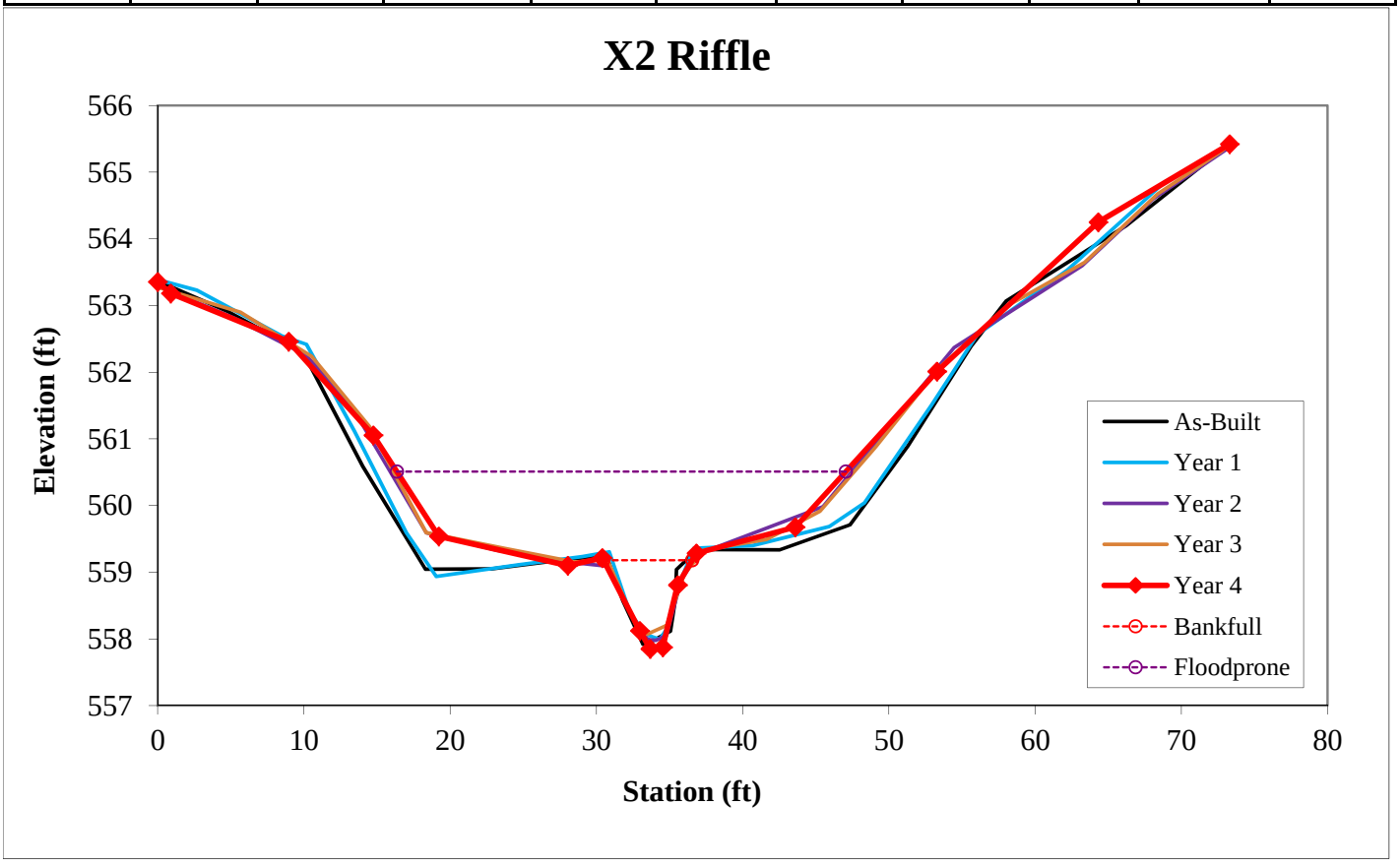
Little River Farm Site: Project No. 000623

(Year 4 Monitoring Data - Collected September 2013)

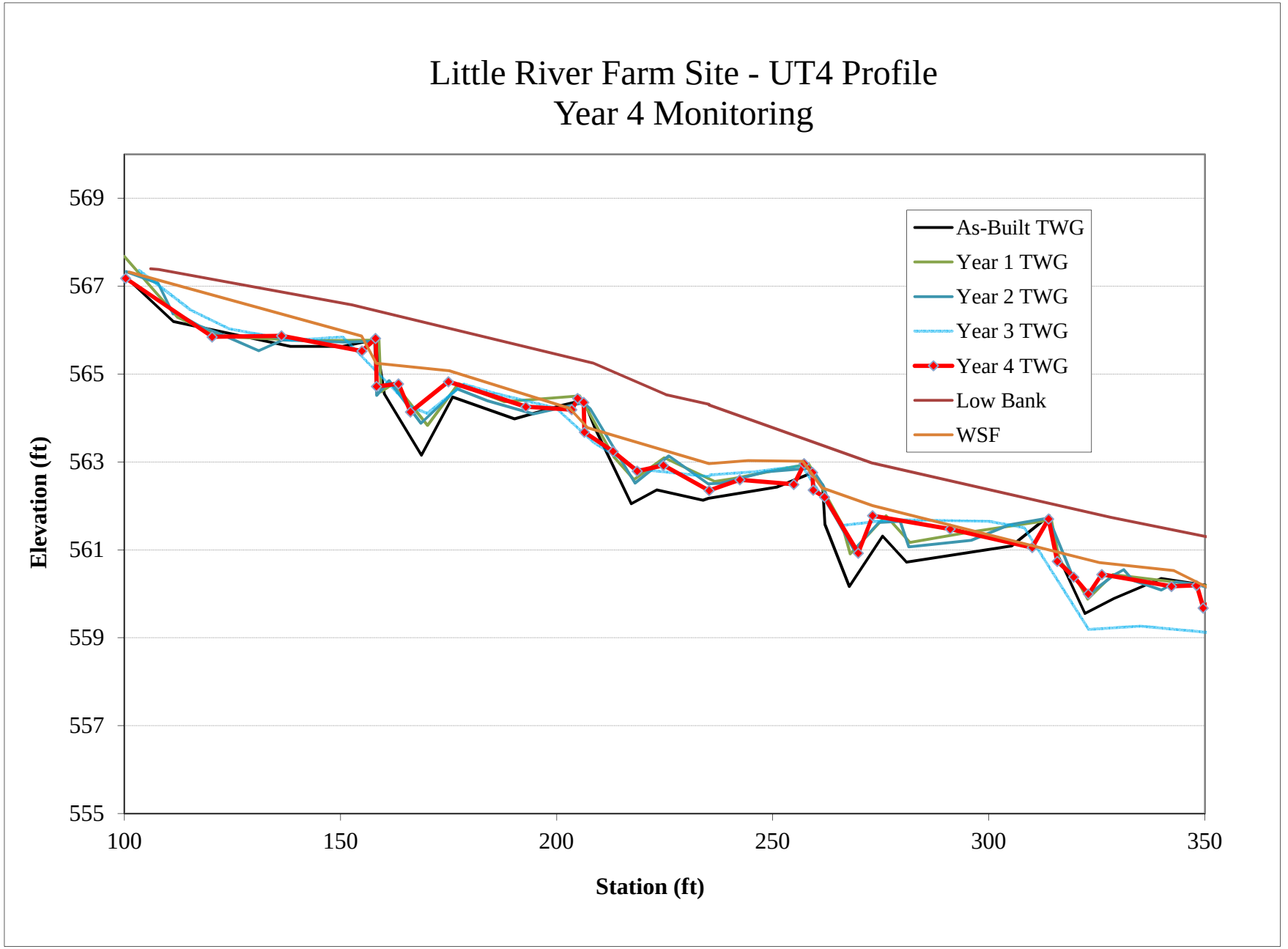
Left Bank

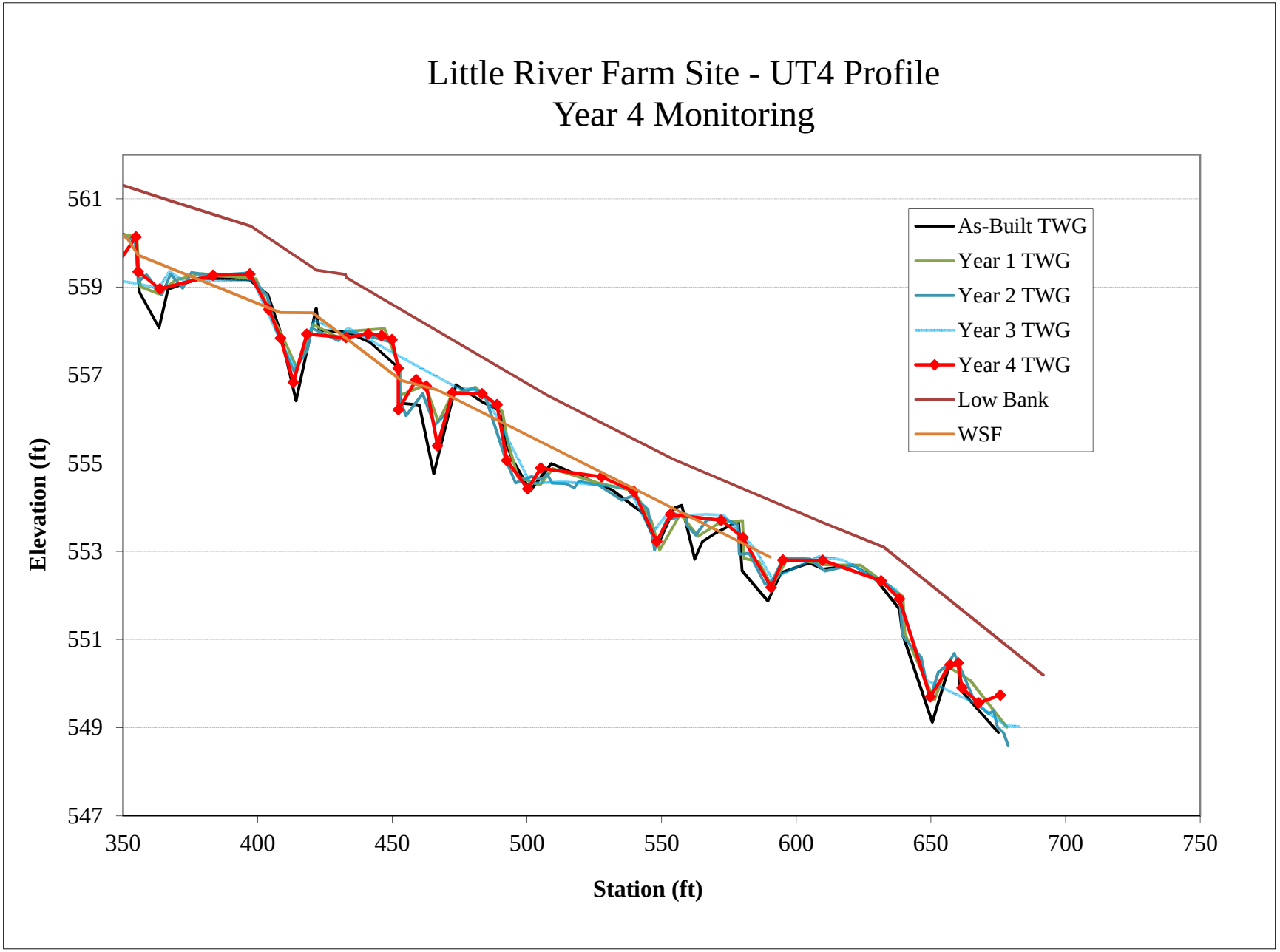
Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	Eb	4.3	6.07	0.71	1.33	8.49	1	5.1	559.18	559.22



LONGITUDINAL PROFILE


Little River Farm Site - UT4 Profile
Year 4 Monitoring
Elevation (ft)
569
567
565
563
561
559
557
555
100
150
200
250
300
350
Station (ft)
As-Built TWG
Year 1 TWG
Year 2 TWG
Year 3 TWG
Year 4 TWG
Low Bank
WSF


Little River Farm Site - UT4 Profile
Year 4 Monitoring
Elevation (ft)
561
559
557
555
553
551
549
547
350
400
450
500
550
600
650
700
750
Station (ft)
As-Built TWG
Year 1 TWG
Year 2 TWG
Year 3 TWG
Year 4 TWG
Low Bank
WSF

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 (ft^2)	-----	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 (ft^3)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
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/ft^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	-----	-----	-----	-----	-----	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/ft^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						Year 4					
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)	5.6	6.6	-----	7.6	-----	2	5.5	7.7	-----	9.9	-----	2	6.1	7.5	-----	8.9	-----	2
Floodprone Width (ft)	29.6	30.6	-----	31.6	-----	2	28.6	28.9	-----	29.2	-----	2	30.7	31.5	-----	32.2	-----	2
BF Mean Depth (ft)	0.7	0.8	-----	0.9	-----	2	0.6	0.6	-----	0.7	-----	2	0.7	0.8	-----	0.8	-----	2
BF Max Depth (ft)	1.1	1.5	-----	1.8	-----	2	1.0	1.3	-----	1.6	-----	2	1.3	1.7	-----	2.0	-----	2
BF Cross-sectional Area (ft^2)	3.7	5.3	-----	6.8	-----	2	3.4	5.0	-----	6.6	-----	2	4.3	5.7	-----	7.1	-----	2
Width/Depth Ratio	8.4	8.5	-----	8.5	-----	2	8.9	11.9	-----	14.9	-----	2	8.5	9.8	-----	11.1	-----	2
Entrenchment Ratio	4.2	4.8	-----	5.3	-----	2	2.9	3.8	-----	4.7	-----	2	3.6	4.4	-----	5.1	-----	2
Bank Height Ratio	1.0	1.0	-----	1.0	-----	2	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	0.01*	0.03*	0.02*	0.05*	-----	10
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pool Spacing (ft)	40.5	47.0	49.0	54.5	-----	9	46.9	73.0	76.2	91.5	-----	6	33.6	46.0	46.9	59.0	-----	10
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/ft^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	-----	-----	-----	-----	-----	0.03	-----	-----
Impervious cover estimate (%)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rosgen Classification	-----	E	-----	-----	-----	-----	-----	E	-----	-----	-----	-----	-----	E	-----	-----	-----	-----
BF Velocity (fps)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BF Discharge (cfs)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valley Length	-----	530.9	-----	-----	-----	-----	-----	529.6	-----	-----	-----	-----	-----	529.6	-----	-----	-----	-----
Channel length (ft)	-----	584.2	-----	-----	-----	-----	-----	580.4	-----	-----	-----	-----	-----	575.5	-----	-----	-----	-----
Sinuosity	-----	1.10	-----	-----	-----	-----	-----	1.10	-----	-----	-----	-----	-----	1.09	-----	-----	-----	-----
Water Surface Slope (Channel) (ft/ft)*	-----	0.03*	-----	-----	-----	-----	-----	0.03*	-----	-----	-----	-----	-----	0.03*	-----	-----	-----	-----
BF slope (ft/ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Bankfull Floodplain Area (acres)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BEHI VL% / L% / M% / H% / VH% / E%	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Channel Stability or Habitat Metric	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Biological or Other	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

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

Table B.2. Morphology and Hydraulic Monitoring Summary
Little River Farm Site: Project No. 000623

UT4 (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	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	8.9		5.7	5.7	5.6	5.5	6.1												
BF Mean Depth (ft)	0.9	0.8	0.9	0.7	0.8		0.8	0.8	0.7	0.6	0.7												
Width/Depth Ratio	7.8	8.6	8.4	14.9	11.1		7.3	7.1	8.5	8.9	8.5												
BF Cross-sectional Area (ft²)	6.6	5.7	6.8	6.6	7.1		4.5	4.5	3.7	3.4	4.3												
BF Max Depth (ft)	2.0	1.7	1.8	1.6	2.0		1.3	1.3	1.1	1.0	1.3												
Width of Floodprone Area (ft)	35.9	32.7	31.6	28.6	32.2		36.1	35.5	29.6	29.2	30.7												
Entrenchment Ratio	5.0	4.7	4.2	2.9	3.6		6.3	6.3	5.3	4.7	5.1												
Bank Height Ratio	1.0	1.0	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	10.5		7.3	7.3	7.0	6.7	7.5												
Hydraulic Radius (ft)	0.7	0.7	0.7	0.6	0.7		0.6	0.6	0.5	0.5	0.6												
Based on current/developing bankfull feature																							
BF Width (ft)	-	-	-	-	-		-	-	-	-	-												
BF Mean Depth (ft)	-	-	-	-	-		-	-	-	-	-												
Width/Depth Ratio	-	-	-	-	-		-	-	-	-	-												
BF Cross-sectional Area (ft²)	-	-	-	-	-		-	-	-	-	-												
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 (ft²)	-	-	-	-	-		-	-	-	-	-												
d50 (mm)	-	-	-	-	-		-	-	-	-	-												
Dimension and substrate	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Based on fixed baseline bankfull elevation																							
BF Width (ft)																							
BF Mean Depth (ft)																							
Width/Depth Ratio																							
BF Cross-sectional Area (ft²)																							
BF Max Depth (ft)																							
Width of Floodprone Area (ft)																							
Entrenchment Ratio																							
Bank Height Ratio																							
Wetted Perimeter (ft)																							
Hydraulic Radius (ft)																							
Based on current/developing bankfull feature																							
BF Width (ft)																							
BF Mean Depth (ft)																							
Width/Depth Ratio																							
BF Cross-sectional Area (ft²)																							
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 (ft²)																							
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	-	-	-
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?	10	10	0	100	
	2. Armor stable (e.g. no displacement)?	10	10	0	100	
	3. Facet grades appears stable?	10	10	0	100	
	4. Minimal evidence of embedding/fining?	10	10	0	100	
	5. Length appropriate?	10	10	0	100	**100%**
B. Pools	1. Present? (e.g. not subject to severe aggradation or migration?)	10	10	0	100	
	2. Sufficiently deep (Max Pool D:Mean Bkf >1.6?)	10	10	0	100	
	3. Length appropriate?	10	10	0	100	**100%**
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	0	100	**100%**
G. Vanes	1. Free of back or arm scour?	9	9	0	100	
	2. Height appropriate?	9	9	0	100	
	3. Angle and geometry appear appropriate?	9	9	0	100	
	4. Free of piping or other structural failures?	9	9	0	100	**100%**
H. Wads/Boulders	1. Free of scour?	9	9	0	100	
	2. Footing stable?	9	9	0	100	**100%**

Stream Problem Area Photos

SPA 1 – Sink Hole Developing at Culvert on UT2 Crossing

SPA 4 – Culvert & Sinkhole Repair Needed on UT3 Crossing

SPA 2 – Fence Repair Needed on UT2 Crossing

SPA 3 – Ford Crossing is Washing Out

APPENDIX C:
VEGETATION DATA

VEGETATION RAW DATA

113115 - Little River Yr 4

Plot 92759-01-0001 — Please fill in any missing data and fix incorrect data. — **Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5): 4 Date: 11/13/2013 - / /

Party: KS & RFB 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
1500	Liriodendron tulipifera	E!	R			15	132.0	5.0	—	>250	1.1+	☐	4		
1-1															
1501	Liriodendron tulipifera	E!	R			16	101.0	DBH?	27+	179.8	0.9+	☐	4		
1-2															
1502	Liriodendron tulipifera	E!	R			11	74.0		25+	134.1	0.6+	☐	4		
1-3															
1504	Corylus cornuta	E!	R			6	73.0		6+	94	—	☐	4		
1-5															
1505	Fraxinus pennsylvanica	E!	R			6	56.0		10+	71.1	—	☐	4		
1-6															
1506	Nyssa sylvatica	E!	R			10	52.0		14+	76.2	—	☐	4		
1-7															
1507	Nyssa sylvatica	E!	R			7	54.0		14+	149.9	0.2+	☐	4		
1-8															
1508	Liriodendron tulipifera	E!	R			6	32.0		7+	58.4	—	☑	4		
1-9															
1509	Betula nigra	E!	R			13	111.0	DBH?	—	>250	1.3+	☐	4		
1-10 Broken stem															
1510	Quercus falcata	E!	R			19	166.0	5.0	25+	213.4	1.4+	☐	4		
1-11															
1511	Carya ovata	E!	R			4	26.0		3+	33	—	☐	3		
1-12 Broken stem															
1512	Celtis laevigata	E!	R						10+	149.4	0.2+	☐	4		

yr1: 1-13 Broken stem | yr3: missing in yr 2

 # 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
1-14 Carpinus caroliniа	U			11+	152.4	0.2+	4		
1-15 Cornus amomum	U			8+	94	—	4		

Volunteers

2-Fraxinus pennsylvanica 50-100 cm
4-Acer negundo 50-100cm
6-Liquidambar Styraciflua >100 cm
5- " " 50-100cm
1-Nyssa sylvanica 50-100 cm
1 Carpinus caroliniа 50-100cm
1 Acer rubra <50cm

*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

113115 - Little River Yr 4

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

VMD Year (1-5): 4 Date: 11/13/2013 - / /

Party: KS & RFB 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
1513	Cornus amomum	E	R			14	210.0	6.0	16+	186.9	0.3+	☐	4		
2-1															
1514	Cornus amomum	E	R			8	70.0		7+	68.6		☐	3		
2-2															
1515	Cornus amomum	E	R			15	180.0	5.0	13+	130	0.3+	☐	4		
2-3 Broken stem but has new growth															
1516	Cornus amomum	E	R			15	190.0	6.0	1+	16.5		☑	2	BEAVER ACTIVITY CUT DOWN	
2-4															
1517	Corylus cornuta	E	R			10	185.0	3.0	10+	116.8		☐	4		
2-5															
1519	Platanus occidentalis	E	R			11	104.0	DBH?		>250	1.1+	☐	4		
2-7															
1520	Quercus falcata	E	R			60	246.0	26.0		>250	3.5+	☐	4		
2-8															
1521	Cornus amomum	E	R			26	236.0	11.0		250	0.9+	☐	4		
2-9															
1522	Cornus amomum	E	R			25	260.0	14.0		>400	1.5+	☐	4		
yr1: 2-10 | yr2: Main stem splitting															
1523	Cornus amomum	E	R			26	220.0	4.0		>250	1.5+	☐	4		
2-11															
1524	Cornus amomum	E	R			24	219.0	9.0	30+	213.4	0.6+	☐	4		
2-12															
1525	Cornus amomum	E	R			21	201.0	9.0	16+	198.1	0.9+	☐	4		
2-13															
1526	Cornus amomum	E	R			21	208.0	8.0		>250	1.5+	☐	4		
2-14 Broken limb															
1527	Cornus amomum	E	R			30	257.0	12.0		>250	2.4+	☐	4		
2-15															
1528	Cornus amomum	E	R			24	182.0	11.0	28+	198.1	0.9+	☐	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.

113115 - LITTLE RIVER YR 4

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

VMD Year (1-5): 4 Date: 11 / 13 / 2013 - / /

Party: KS & RFB 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
1534	Quercus michauxii	EI	R			10	72.0		✓	13+	140.2	0.3+	☐	4		
3-6																
1536	Platanus occidentalis	EI	R			31	236.0	13.0	✓	/	>400	4.4+	☐	4		
yr1: 3-8 | yr2: Intentional cut																
1537	Quercus michauxii	EI	R			9	31.0		/	6+	111.8	/	☑	4		
3-9																
1539	Corylus cornuta	EI	R			6	67.0		/	7+	86.4	/	☐	2		
3-11 Broken stem/new growth																
1540	Corylus cornuta	EI	R			9	97.0		/	7+	129.5	/	☐	2		
3-12 Broken stem/new growth																

 # 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
✓	3-13 Corylus cornuta	P			10+	182.9	0.5+	4		
✓	3-14 Quercus michauxii	P			15	163.8	0.4+	4		
✓	3-15 Juglans nigra	P			/	>250	2.4+	4		
✓	3-16 Liriodendron tulipifera	P			/	>250	1.4+	4		
✓	3-17 Acer negundo	P			/	208.3	0.8+	4		
✓	3-18 Quercus falcata var. pagodifolia	P			13+	223.5	0.8+	4		

*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.

113115 - Little River Yr 4

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

VMD Year (1-5): 4 Date: 11/11/2013 - / /

Party: KS & RFB 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			10	50.0	/	9+	61	/	☐	2.5		Herbicide?
4-1															
525	Quercus laurifolia	E!	R			26	131.0	6.0	/	>250	2.2+	☐	4		
yr1: 4-11 | yr2: Intentional cut (clean)															
527	Quercus laurifolia	E!	R			19	90.0	/	/	>250	1.7+	☐	4		
yr1: 4-13 | yr2: Intentional cut															
2358	Quercus michauxii	E!	R			6	55.0	/	15+	121.9	0.4+	☐	4		
4-14 - Supp Planting Spring 2011															
2359	Quercus michauxii	E!	R			5	35.0	/	7+	71.1	/	☐	3		
4-15 - Supp Planting Spring 2011															
2360	~~Betula nigra~~ Carpinus caroliniana	E!	R			7	102.0	DBH?	10+	121.9	0.2+	☐	3		
4-16 - Supp Planting Spring 2011															
2571	Diospyros virginiana	E!	U			18	116.0	DBH?	16+	134.6	0.1	☐	3		

 # stems: 7

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
4-18 Q michauxii	P			15+	200.7	0.9+	4		Supplemental Planting
4-19 L. tulipfera	P			22+	203.2	1.1+	4		"
4-20 L. tulipfera	P			23+	>250	1.4+	4		"
4-21 F. pennsylvanica	P			13+	146.1	0.4+	4		"
4-22 L. tulipfera	U			2+	15.2	/	3		—
4-23 Ilex opaca	U			21+	133.4	0.3+	4		—
4-24 Ilex opaca	U			/	>250	5.4+	4		—
4-25 Q. falcata	U			15+	152.4	0.4+	3		—

Volunteers

12 - Liquidambar styraciflua < 50cm

*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.

Little River 113115

Plot 92759-01-0005 — Please fill in any missing data and fix incorrect data. — **Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5): 4 Date: 11 / 13 / 2013 - / /

Party: KS & RFB Role:

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

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	Asimina triloba	E	R			8	65.0		10+	82.6		☐	4		
5-1															
1545	Asimina triloba	E	R			6	65.0		9+	92.7		☐	4		
5-4															
1546	Cornus florida	E	R			14	136.0	5.0		>250	1.1+	☐	4		
5-5															
1547	Cornus florida	E	R			15	210.0	DBH!!		>250	.7+	☐	4		
5-6															
1548	Cornus florida	E	R			21	155.0	4.0	29+	180.3	.7+	☐	4		
5-7															
1549	Corylus cornuta	E	R			7	80.0		9+	149.9	.2+	☐	4		
5-8															
1550	Quercus michauxii	E	R			32	270.0	19.0		>400	3.3+	☐	4		
yr1: 5-9 | yr3: Greater than 270 cm															
1551	Quercus michauxii	E	R			29	226.0	13.0		>400	3.7+	☐	4		
5-10															
1552	Quercus michauxii	E	R			55	270.0	26.0		>400	4.5+	☐	4		
yr1: 5-11 | yr3: Greater than 270 cm															
1553	Liriodendron tulipifera	E	R			35	235.0	18.0		>400	4.4+	☐	4		
5-12															
1554	Cornus florida	E	R			23	175.0	7.0		>250	1.1+	☐	4		
5-13															

 # stems: 11

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

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

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

*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

113115 - Little River

Plot 92759-01-0006 — Please fill in any missing data and fix incorrect data. — **Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5): 4 Date: 11/12/13 - / /

Party: KS & RFB 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
1560	Fraxinus pennsylvanica	EI	R			20	157.0	9.0	/	>400	2.0+	☐	4		
6-6															
1561	Fraxinus pennsylvanica	EI	R			30	270.0	12.0	/	>400	3.2+	☐	4		
yr1: 6-7 | yr3: Greater than 270 cm															
1562	Quercus michauxii	EI	R			10	68.0		3	143.5	.3+	☐	4		
yr1: 6-8 | yr2: Broken branches															
1563	Fraxinus pennsylvanica	EI	R			21	124.0	DBH?	/	7250	1.5+	☐	4		
6-9															
1564	Platanus occidentalis	EI	R			14	146.0	DBH!!	/	>400	2.3+	☐	4		
6-10															
1565	~~Corylus cornuta~~ Carpinus caroliniana	EI	R			30	160.0	7.0	/	>250	1.8+	☐	4		
6-11															
1566	Liriodendron tulipifera	EI	R			5	33.0	✓	3+	38.1	/	☐	4		resprout
6-12															
1567	Platanus occidentalis	EI	R			35	226.0	16.0	/	>400	3.7+	☐	4		
6-13															
1568	Carpinus caroliniana	EI	R			11	84.0	✓	16+	121.9	.3+	☐	4		Broken stems
6-14															
1569	Fraxinus pennsylvanica	EI	R			21	167.0	7.0	/	7250	2.2+	☐	4		
6-15															
1570	Carpinus caroliniana	EI	R			16	136.0	DBH?	/	>250	1.2+	☐	4		
6-16															
1571	Platanus occidentalis	EI	R			15	141.0	6.0	/	7250	2.0+	☐	4		
6-17															
1572	Carpinus caroliniana	EI	R			4	166.0	13.0	/	5+	77.5	/	☐	4		resprout
6-18															
1573	Fraxinus pennsylvanica	EI	R			19	139.0	6.0	/	13+	176.5	.7+	☐	4	
6-19															
2361	Quercus michauxii	EI	R			8	40.0		/	9+	82.6	/	☐	4	
6-20 - Supp Planting Spring 2011															
2362	Fraxinus pennsylvanica	EI	R			20	131.0	5.0	/	/	7250	2.0	☐	4	
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.

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Plot (continued): 92759-01-0006

ID	Species	map char	source	X (m)	Y (m)	Last Year's Data: ddh (mm)	Height (cm)	DBH (cm)	THIS YEAR'S DATA: ddh (mm)	Height (cm)	DBH (cm)	Re-sprout	Vigor*	Damage*	Notes

 # stems: 16 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
6-5 C. cornuta				6+	85.1	—	4		resprout
6-18 Carpinus caroliniana				/	7250	13+	4		

Liquidambar / Styraciflua 1 >100
1 50-100

*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.

113115 - LITTLE RIVER

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

VMD Year (1-5): 4 Date: 11/13/2013 - / /

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
1574	Quercus laurifolia	EI	R			19	150.0	DBH!!	/	7250	24+	☐	4		
7-1															
1577	Quercus michauxii	EI	R			3	33.0		/	11+	95.3	/	☐	4	
yr1: 7-4 | yr2: Broken branches															
1579	Quercus laurifolia	EI	R			25	164.0	8.0	/	>250	25+	☐	4		
7-6															
1580	Quercus michauxii	EI	R			17	134.0	DBH?	/	7250	1.7+	☐	4		
7-7															
1582	Liriodendron tulipifera	EI	R			12	37.0		/	7250	1.6+	☐	4		
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
7-10 Juglans nigra				17+	130	.7+	4		
7-11 Quercus falcata				11+	162.6	.6+	4		
7-12 Juglans nigra				20+	142.2	.9	4		
7-13 Liriodendron tulipifera				21+	172.1	.7+	4		
7-14 Fraxinus pennsylvanica				13+	135.9	.4+	4		
7-15 Juglans nigra				8+	63.5	/	4		

*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, ing.

*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.

.SION drops to 10cm if >2.5m and 50cm if >4m.

113115 - LITTLE RIVER

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

VMD Year (1-5): 4 Date: 11/13/13 - / /

Party: KS + RFB 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			28	195.0	14.0	/	>250	2.2+	☐	4		
8-2															
1592	Quercus michauxii	E	R			17	154.0	4.0	/	>250	1.4+	☐	4		
8-3															
1595	Quercus laurifolia	E	R			25	226.0	15.0	/	>250	2.3+	☐	4		
yr1: 8-6 | yr2: Damanged trunk															
1597	~~Betula nigra~~ Carpinus Caroliniana	E	R			35	270.0	15.0	/	>400	3.0+	☐	4		
yr1: 8-8 | yr3: Greater than 270 cm															
1598	Asimina triloba	E	R			5	43.0		/	MISSING		☐	?		
yr1: 8-9 | yr2: Damaged trunk)															
1599	Betula nigra	E	R			28	268.0	11.0	/	>250	3.2+	☐	4		
8-10															
1601	Platanus occidentalis	E	R			69	270.0	42.0	/	>400	8.9+	☐	4		
yr1: 8-12 | yr2: Greater than 270 | yr3: Greater than 270 cm															
1602	Fraxinus pennsylvanica	E	R			20	243.0	10.0	/	>250	1.9+	☐	4		
8-13															
1603	Fraxinus pennsylvanica	E	R			20	152.0	12.0	/	>250	1.2+	☐	4		
8-14															
1604	~~Platanus occidentalis~~ Fraxinus pennsyl.	E	R			21	131.0	8.0	/	2.3+	2.07	1.0+	☐	4	
8-15															
1605	Fraxinus pennsylvanica	E	R			16	177.0	8.0	/	>250	1.5+	☐	4		
8-16															

 # 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
✓	8-7 Quercus laurifol	R			11	52.2	/	2		resprout
/	8-11 Fraxinus pennsyl.	P			/	>250	2.9+	4		
/	8-17 Juglans nigra	P			/	>250	2.2+	4		
/	8-18 Acer negundo	P			/	>250	.8+	4		
/	8-19 Fraxinus pennsyl.	P			22	185.9	1.1+	4		

✓ Liquid ambar 2 50-100
styraciflua 1 >100
/ Fraxinus penn. 2 50-100

*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

LITTLE RIVER - 113115

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

VMD Year (1-5): 4 Date: 11/12/2013 - / /

Party: KS + RFB 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
1607	✓Quercus falcata	E!	R			18	118.0	8.0	/	>250	2.0+	☐	4		
yr1: 9-2 | yr2: Bent over damaage															
1608	Quercus michauxii	E!	R			59	270.0	26.0	/	>400	3.9+	☐	4		
yr1: 9-3 | yr3: Greater than 270 cm															
1609	Quercus falcata	E!	R			51	270.0	35.0	/	>400	5.7+	☐	4		
yr1: 9-4 | yr3: Greater than 270 cm															
1610	Cornus ~~amomum~~	E!	R			27	195.0	11.0	/	7250	1.2+	☐	4		
9-5	florida														
1613	Cornus amomum	E!	R			23	174.0	9.0	/	>250	.8+	☐	4		
9-8															
1614	Corylus cornuta	E!	R			10	90.0	✓	8+	111.8	/	☐	4		
9-9															
1615	Corylus cornuta	E!	R			15	110.0	DBH?	/	13+	124.5	/	☐	4	
9-10															
1619	Platanus occidentalis	E!	R			60	270.0	31.0	✓	/	>400	7.5+	☐	4	
yr1: 9-14 | yr3: Greater than 270 cm															
1620	Platanus occidentalis	E!	R			31	245.0	16.0	✓		>400	5.6+	☐	4	
9-15															
1621	Fraxinus pennsylvanica	E!	R			27	165.0	7.0	/	7250	1.2+	☐	4		
9-16															
1622	Platanus occidentalis	E!	R			60	270.0	33.0	✓	/	>400	23+	☐	4	
yr1: 9-17 | yr3: Greater than 270 cm															

 # 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
✓9-18 A. triloba				107	83.8	/	4		

~~Redbud 1 <50~~

✓Liquid ambar styraciflua 1 50-100

1 <50

*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

113115- LITTLE RIVER

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

VMD Year (1-5): 4 Date: 11/12/2013 - / /

Party: KS + RFB 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			81	270.0	50.0	✓	/	>400	10.9	☐	4		
yr1: 10-1 | yr2: Greater than 270 cm | yr3: Greater than 270 cm																
1624	Celtis laevigata	E	R			10	36.0		✓	10	41.9	/	☐	2	stems bitten off	
10-2																
1625	Quercus laurifolia	E	R			51	270.0	31.0	✓	/	>400	5.7+	☐	4		
yr1: 10-3 | yr3: Greater than 270 cm																
1626	Quercus michauxii	E	R			30	248.0	15.0	/	/	>400	3.0+	☐	4		
10-4																
1627	Cornus amomum	E	R			23	208.0	10.0	/	/	250	1.3+	☐	4		
10-5																
1628	Quercus michauxii	E	R			23	182.0	8.0	/	/	>250	2.4+	☐	4		
10-6																
1629	~~Nyssa sylvatica~~ Cornus amomum	E	R			12	138.0	DBH!!	/	16+	150	.6+	☐	4		
10-7																
1630	~~Nyssa sylvatica~~ Cornus amomum	E	R			15	190.0	6.0	✓	20+	200	1.0+	☐	4		
10-8																
1632	Betula nigra	E	R			89	270.0	72.0	/	/	>400	11.9	☐	4		
yr1: 10-10 | yr2: Greater than 270 cm | yr3: Greater than 270 cm																
1633	Platanus occidentalis	E	R			74	270.0	49.0	/	/	>400	8.4+	☐	4		
yr1: 10-11 | yr2: Greater than 270 cm | yr3: Greater than 270 cm																
1634	Celtis laevigata	E	R			26	202.0	10.0	/	/	>400	1.6+	☐	4		
10-12																
1635	Cornus ~~amomum~~ florida	E	R			38	133.0	11.0	/	/	250	2.7+	☐	4		
10-13																
1636	Cornus ~~amomum~~ florida	E	R			29	173.0	6.0	/	/	>250	1.0+	☐	4		
10-14																
1637	~~Nyssa sylvatica~~ Cornus florida	E	R			22	138.0	DBH!!	✓	/	>250	1.0+	☐	4		
10-15																
1638	Cornus ~~amomum~~ florida	E	R			24	165.0	9.0	/	32+	186.7	.7+	☐	4		
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

Liquidambar styraciflua 4 >100 1 <50

Liriodendron tulip 1 <50

113115 - LITTLE RIVER

Plot 92759-01-0011 — Please fill in any missing data and fix incorrect data. — **Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5): 4 Date: 11/12/13 - / /

Party: KS + RFB 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			41	255.0	16.0	✓	/	>250	30+	☐	4		
11-1																
1640	Quercus nigra	E!	R			6	45.0		✓	12+	92.7	/	☐	3		
11-2																
1641	Quercus nigra	E!	R			24	78.0		✓	10+	108	/	☐	3		resprout
11-3																
1642	Quercus falcata	E!	R			28	187.0	11.0	✓	/	>250	23+	☐	4		
11-4																
1643	Quercus falcata	E!	R			39	218.0	16.0	✓	/	>250	30+	☐	4		
11-5																
1644	Quercus laurifolia	E!	R			41	258.0	12.0	✓	/	>250	28+	☐	4		
11-6																
1645	Quercus laurifolia	E!	R			36	270.0	16.0	✓	/	>400	34+	☐	4		
yr1: 11-7 | yr3: Greater than 270 cm																
1646	Betula nigra	E!	R			21	223.0	9.0	✓	/	>250	24+	☐	4		
11-8																
1647	Fraxinus pennsylvanica	E!	R			12	84.0		✓	14	120.4	5+	☐	3		
11-9																
1648	Quercus falcata	E!	R			30	160.0	10.0	✓	/	>250	19	☐	4		
11-10																
1649	Quercus falcata	E!	R			37	270.0	16.0	✓	/	>400	35+	☐	4		
yr1: 11-11 | yr3: Greater than 270 cm																
1650	Quercus michauxii	E!	R			35	239.0	19.0	✓	/	>400	30+	☐	4		
11-12																

 # stems: 12

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

Species Name	Source*	X (m)	Y (m)	ddh 1 mm	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes
/ Liquidambar styraciflua				/	50-100		/	7100	
/ Carya ovata				/	<50				

*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.

113115 - LITTLE RIVER [redacted]

Plot 92759-01-0012 — Please fill in any missing data and fix incorrect data. — **Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5): 4 Date: 11/12/13 - / /

Party: KS 1 RFB Role:

Notes on plot:

Taxonomic Standard:

Taxonomic Standard DATE:

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

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
1651	Quercus falcata	E!	R			23	124.0	DBH? ✓	35+	144.2	.7+	☐	4		
12-1															
1652	Quercus laurifolia	E!	R			36	216.0	17.0 ✓	—	>250	2.7+	☐	4		
12-2															
1653	Quercus laurifolia	E!	R			17	180.0	7.0 ✓	—	>250	1.4+	☐	4		
12-3															
1654	Quercus laurifolia	E!	R			34	258.0	17.0 ✓	—	>400	3.3+	☐	4		
12-4															
1655	Liriodendron tulipifera	E!	R			28	219.0	14.0 ✓	—	>400	2.7+	☐	4		
12-5															
1656	Quercus falcata	E!	R			12	96.0	✓	16+	128	.3+	☐	4		
12-6															
1657	Quercus michauxii	E!	R			46	211.0	25.0 ✓	—	>250	3.5+	☐	4		
12-7															
1658	Quercus michauxii	E!	R			10	84.0	✓	15+	133.4	—	☐	4		
12-8															
1660	Betula nigra	E!	R			66	257.0	33.0	—	>400	6.4+	☐	4		
12-10															
1662	Liriodendron tulipifera	E!	R			29	152.0	7.0	—	—	—	☐	—	beaver	chopped
12-12															
1663	Quercus falcata	E!	R			39	242.0	13.0	—	—	—	☐	—	beaver	chopped
12-13															

 # stems: 11

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

Species Name	Source*	X (m)	Y (m)	ddh 1 mm	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes
12-14 Quercus alba				7+	71.1	✓	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.

113115 - LITTLE RIVER

Plot 92759-01-0013 — Please fill in any missing data and fix incorrect data. — **Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5): 4 Date: 11/11/2013 - / /

Party: KS + RFB Role:

Notes on plot:

Taxonomic Standard:

Taxonomic Standard DATE:

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

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

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			21	236.0	11.0	✓	22+	121,9	,3+	☐	4	beaver	resprout
13-1																
530	Carpinus caroliniana	E!	R			9	86.0		✓	13+	213,4	,4+	☐	4		
13-3																
531	Platanus occidentalis	E!	R			45	270.0	28.0	✓	/	7270	1.3+	☐	4	beaver	resprout
yr1: 13-4 | yr3: Greater than 270 cm																
533	Platanus occidentalis	E!	R			49	270.0	23.0	✓	/	7400	5.6+	☐	4		
yr1: 13-6 | yr3: Greater than 270 cm																
534	Quercus michauxii	E!	R			17	205.0	10.0	✓	/	7250	2.0+	☐	4		
13-7																
535	Quercus nigra	E!	R			23	244.0	13.0	✓	/	7250	2.1+	☐	4		
13-8																
537	Quercus falcata	E!	R			37	270.0	21.0	✓	/	7400	3.7+	☐	4		
yr1: 13-10 | yr3: Greater than 270 cm																
538	Liriodendron tulipifera	E!	R			35	263.0	19.0	✓	/	7400	4.2+	☐	4		
13-11																
539	Liriodendron tulipifera	E!	R			22	167.0	9.0	✓	/	7400	2.8	☐	4		
13-12																
540	Platanus occidentalis	E!	R			25	196.0	DBH!!	✓	/	7400	3.2+	☐	4		
13-13																
541	Quercus falcata	E!	R			24	204.0	10.0	✓	/	7400	2.4	☐	4		
13-14																
2367	Ulmus alata	E!	U			13	154.0	DBH!!	✓	/	7250	,5+	☐	4		
13-15 - Volunteer																
2368	Fraxinus pennsylvanica	E!	R			41	270.0	20.0	✓	/	7400	3.5+	☐	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
13-2 Cephalanthus occidentalis				5	103,1	/	2.5		not counted previously ✓

✓ Fraxinus pennsyl — 50 — >50

✓ 50 — 7100

✓ Ulmus alata — 1 — >100

*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.

113115 - Little River

Plot 92759-01-0014 — Please fill in any missing data and fix incorrect data. — **Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5): 4 Date: 11/11/13 - / /

Party: ICS + RFB 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			13	128.0	DBH?	✓	22+	7250	.7+	☐	4		
14-1																
543	Cornus amomum	E	R			7	70.0		✓	8+	102.9	—	☑	3		resprout
14-2																
544	Cornus amomum	E	R			14	111.0	DBH?	✓	17+	7250	.6+	☐	4		
14-3																
547	Quercus laurifolia	E	R			34	233.0	11.0	✓	—	7400	2.8+	☐	4		
14-6																
549	Cornus amomum	E	R			14	111.0	DBH?	✓	20+	228.6	.6+	☐	4		
yr1: 14-8 | yr2: Multiple dead stems																
552	Quercus falcata	E	R			25	208.0	8.0	✓				☐			missing
14-11																
2364	Quercus michauxii	E	R			16	111.0	DBH?	✓	20+	167.6	.7+	☐	4		
14-12 - Supp Planting Spring 2011																
2365	Quercus falcata	E	R			11	78.0		✓	—	203.2	1.0+	☐	4		
14-13 - Supp Planting Spring 2011																
2572 (14-15)	Fraxinus pennsylvanica	E	U			7	74.0		✓	16+	119.4	.5+	☐	4		
2573 (14-16)	Diospyros virginiana	E	U			9	114.0	DBH?	✓	18+	196.9	.7+	☐	4		
2574 (14-17)	Platanus occidentalis	E	U			4	31.0		✓	14+	128.3	—	☐	3		
2575 (14-18)	Diospyros virginiana	E	U			4	29.0		✓	9+	78.7	—	☐	3		

 # stems: 12

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

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

✓ Liriodendron tulipifera 1 <50

✓ Liquidambar styraciflua 1 <50

*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.

11315 - LITTLE RIVER

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

VMD Year (1-5): 4 Date: 11/11/2013 - / /

Party: KS + RFB 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
1668	Liriodendron tulipifera	EI	R			30	173.0	10.0 ✓	/	>400	3.1+	☐	4		
15-2															
1669	Liriodendron tulipifera	EI	R			19	128.0	DBH? ✓	28+	>250	1.7+	☐	4		
15-3															
1670	Liriodendron tulipifera	EI	R			19	142.0	6.0 ✓	30+	>400	1.7+	☐	4		
15-4 New Growth															
1674	Quercus falcata	EI	R			33	231.0	21.0	/	>400	4.0+	☐	4		
15-8															
1675	Quercus falcata	EI	R			28	270.0	14.0 ✓	/	>400	3.5+	☐	4		
yr1: 15-9 | yr3: Greater than 270 cm															
1676	Quercus falcata	EI	R			29	270.0	21.0 ✓	/	>400	3.6+	☐	4		
yr1: 15-10 | yr3: Greater than 270 cm															
1680	Carya ovata	EI	R			17	205.0	DBH!! ✓	14+	81.3	/	☐	1.5		broken, dead tip
15-14															
1681	Fraxinus pennsylvanica	EI	R			39	270.0	22.0 ✓	/	>400	4.5+	☐	4		
yr1: 15-15 | yr3: Greater than 270 cm															
1682	Quercus laurifolia	EI	R			23	161.0	6.0 ✓	/	>250	1.7+	☐	4		
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
✓ 15-1 Fraxinus penn.				22+	177.8	.9+	4		
✓ 15-17 Fraxinus penn.				/	>400	3.0+	4		
✓ 15-18 Quercus nigra				/	>250	1.1+	4		
✓ 15-19 Prunus serotina				15+	161.3	.4+	4		
✓ 15-20 Fraxinus penn.				/	>400	1.7+	4		
✓ 15-21 Fraxinus penn				19+	>250	1.0+	4		
✓ Fraxinus penn.	10	50-100							
✓ 15-22 Prunus serotina				/	>250	1.1+	4		
✓ 15-23 Quercus falcata				20+	203.2	.8+	4		
✓ 15-24 Fraxinus penn.				/	>400	2.5+	4		

*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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113115 - LITTLE RIVER

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

VMD Year (1-5): 4 Date: 11/12/13 - / /

Party: KS + RFB 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
1683	Cornus ~~florida~~ amomum	E	R			7	81.0	✓	7+	109.2	/	☐	4		
16-1															
1684	Cornus amomum	E	R			10	71.0	✓	10+	109.2	/	☐	3		
16-2															
1685	Quercus michauxii	E	R			47	270.0	32.0 ✓	/	>400	4.6+	☐	4		
yr1: 16-3 | yr3: Greater than 270 cm															
1686	Quercus michauxii	E	R			42	270.0	20.0 ✓	/	>400	3.2+	☐	4		
yr1: 16-4 | yr3: Greater than 270 cm															
1687	Quercus falcata	E	R			53	270.0	34.0 ✓	/	>400	5.5+	☐	4		
yr1: 16-5 | yr2: Greater than 270 | yr3: Greater than 270 cm															
1688	Cornus ~~amomum~~ florida	E	R			31	270.0	18.0 ✓		>250	2.6+	☐	4		
yr1: 16-6 | yr3: Greater than 270 cm															
1689	Cornus ~~amomum~~ florida	E	R			29	257.0	14.0 ✓	/	>250	2.3+	☐	4		
16-7															
1690	Cornus ~~amomum~~ florida	E	R			36	242.0	14.0 ✓	/	>250	2.5+	☐	4		
16-8															
1691	Cornus ~~amomum~~ florida	E	R			21	192.0	7.0 ✓	/	>250	1.6+	☐	4		
16-9															
1692	Celtis laevigata	E	R			15	132.0	DBH? ✓	6	368	/	☐	3		resprout
16-10															
1693	Cornus amomum	E	R			23	185.0	6.0 ✓				☐		Beaver Chopped	
16-11															
1696	Quercus michauxii	E	R			31	223.0	16.0 ✓	—	—	—	☐	2	Beaver Chopped	~~Missing~~
16-14															
2363	Quercus falcata	E	R			10	100.0	✓	20+	180.3	4+	☐	4		
16-15 - 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
16-16 Cornus Florida								beaver chopped	

Acer rubrum 1 <50 — Diospyrus virgin. 1 >100

Liquidambar styraciflua 1 50-100

1 <50

*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.

113115 - LITTLE RIVER

Plot 92759-01-0017 — Please fill in any missing data and fix incorrect data. — **Vegetation Monitoring Data (VMD) Datasheet**

VMD Year (1-5): 4 Date: 11/12/2013 - / /

Party: KS + RFB Role:

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

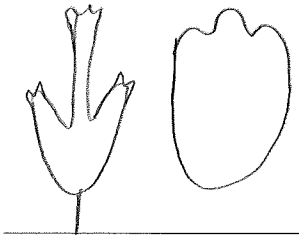
Notes on plot:

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
1697	Fraxinus pennsylvanica	E!	R			40	193.0	9.0	✓	/	7250	2.7+	☐	4		
17-1																
1699	Fraxinus pennsylvanica	E!	R			36	245.0	15.0	✓	/	>400	3.2+	☐	4		
17-3																
1700	Fraxinus pennsylvanica	E!	R			54	270.0	20.0	✓	/	>400	3.4+	☐	4		
yr1: 17-4 | yr3: Greater than 270 cm																
1702	Platanus occidentalis	E!	R			91	270.0	45.0	✓	/	>400	7.5+	☐	4		
yr1: 17-6 | yr2: Greater than 270 | yr3: Greater than 270 cm																
1704	Quercus falcata	E!	R			66	270.0	47.0	✓	/	>400	7.3+	☐	4		
yr1: 17-8 | yr3: Greater than 270 cm																
1707	Quercus laurifolia	E!	R			11	85.0		✓	10+	134.6	.1+	☐	4		
17-11																
1708	Quercus nigra	E!	R			8	60.0		✓	8+	67.1	/	☐	4		
17-12																
1923	Quercus michauxii	E!	R			54	212.0	24.0	✓	16+	158.8	.3+	☐	4		resprout
17-5 - Recorded as missing in Year 1 (Stem 1701)																
2369	Platanus occidentalis	E!	R			17	150.0	DBH!!	✓	/	7250	2.7+	☐	4		
17-13 - Supp Planting Spring 2011																
2370	Platanus occidentalis	E!	R			31	260.0	12.0	✓	/	>400	5.8+	☐	4		
17-14 - Supp Planting Spring 2011																
2576	Liriodendron tulipifera	E!	U			11	72.0		✓	26+	250	1.3	☐	4		
17-15																

 # 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
✓	17-16 Quercus montana				/	>250	3.2+	4		
✓	17-17 Platanus occid.				/	7400	3.9+	4		



*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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TABLES C.1 THROUGH C.7

Table C.1. Vegetation Metadata

Little River Farm Site: Project No. 000623	
Report Prepared By	Kristi Suggs
Date Prepared	11/20/2013 13:18
database name	cvs-eep-entrytool-v2.2.7.mdb
database location	C:
computer name	CHABLKSUGGS
file size	40050688
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	3					1	
	Betula nigra	river birch	7						
	Carya ovata	shagbark hickory		1	1				
	Celtis laevigata	sugarberry	2	1	2				
	Cephalanthus occidentalis	common buttonbush			1				
	Cornus amomum	silky dogwood	19	3	1				1
	Cornus florida	flowering dogwood	13						1
	Diospyros virginiana	common persimmon	1	2					
	Fraxinus pennsylvanica	green ash	27	1					
	Juglans nigra	black walnut	5						
	Nyssa sylvatica	blackgum	2						
	Quercus alba	white oak		1					
	Quercus falcata	southern red oak	23	1				1	1
	Quercus laurifolia	laurel oak	14		1				
	Quercus michauxii	swamp chestnut oak	27	1					1
	Quercus montana	chestnut oak	1						
	Quercus nigra	water oak	2	2					
	Ulmus alata	winged elm	1						
	Ilex opaca	American holly	2						
	Carpinus caroliniana	American hornbeam	7	1					
	Corylus cornuta	beaked hazelnut	7		2				
	Liriodendron tulipifera	tuliptree	18	1					1
	Platanus occidentalis	American sycamore	17	1					
	Prunus serotina	black cherry	2						
	Acer negundo	boxelder	2						
TOT:	**25**	**25**	**202**	**16**	**8**	**0**	**0**	**2**	**5**

Table C.3. Vegetation Damage by Species

Little River Farm Site: Project No. 000623

	Species	Common Name	Count of Damage Categories	No Damage	Other	Beaver	Unknown
	Acer negundo	boxelder	0	2			
	Asimina triloba	pawpaw	0	4			
	Betula nigra	river birch	0	7			
	Carpinus caroliniana	American hornbeam	1	7			1
	Carya ovata	shagbark hickory	1	1	1		
	Celtis laevigata	sugarberry	2	3	1	1	
	Cephalanthus occidentalis	common buttonbush	0	1			
	Cornus amomum	silky dogwood	2	22		2	
	Cornus florida	flowering dogwood	1	13		1	
	Corylus cornuta	beaked hazelnut	0	9			
	Diospyros virginiana	common persimmon	0	3			
	Fraxinus pennsylvanica	green ash	0	28			
	Ilex opaca	American holly	0	2			
	Juglans nigra	black walnut	0	5			
	Liriodendron tulipifera	tuliptree	1	19		1	
	Nyssa sylvatica	blackgum	0	2			
	Platanus occidentalis	American sycamore	0	18			
	Prunus serotina	black cherry	0	2			
	Quercus alba	white oak	0	1			
	Quercus falcata	southern red oak	1	25		1	
	Quercus laurifolia	laurel oak	0	15			
	Quercus michauxii	swamp chestnut oak	1	28		1	
	Quercus montana	chestnut oak	0	1			
	Quercus nigra	water oak	0	4			
	Ulmus alata	winged elm	0	1			
TOT:	**25**	**25**	**10**	**223**	**2**	**7**	**1**

Table C.4. Vegetation Damage by Plot

Little River Farm Site: Project No. 000623

	Plot	Count of Damage Categories	No Damage	Other	Beaver	Unknown	
	92759-01-0001-year:4	0	14				
	92759-01-0002-year:4	1	14		1		
	92759-01-0003-year:4	0	11				
	92759-01-0004-year:4	1	14	1			
	92759-01-0005-year:4	0	11				
	92759-01-0006-year:4	1	17			1	
	92759-01-0007-year:4	0	11				
	92759-01-0008-year:4	0	16				
	92759-01-0009-year:4	0	12				
	92759-01-0010-year:4	1	14		1		
	92759-01-0011-year:4	0	12				
	92759-01-0012-year:4	2	10		2		
	92759-01-0013-year:4	0	14				
	92759-01-0014-year:4	0	12				
	92759-01-0015-year:4	1	17	1			
	92759-01-0016-year:4	3	11		3		
	92759-01-0017-year:4	0	13				
TOT:	**17**	**10**	**223**	**2**	**7**	**1**	

Table C.5. Stems by Plot and Species

Little River Farm Site: Project No. 000623																							
	Comment	Species	Common Name	Total Planted Stems	# Plots	Avg# Stems	plot 92759-01-0001-year:4	plot 92759-01-0002-year:4	plot 92759-01-0003-year:4	plot 92759-01-0004-year:4	plot 92759-01-0005-year:4	plot 92759-01-0006-year:4	plot 92759-01-0007-year:4	plot 92759-01-0008-year:4	plot 92759-01-0009-year:4	plot 92759-01-0010-year:4	plot 92759-01-0011-year:4	plot 92759-01-0012-year:4	plot 92759-01-0013-year:4	plot 92759-01-0014-year:4	plot 92759-01-0015-year:4	plot 92759-01-0016-year:4	plot 92759-01-0017-year:4
		Acer negundo	boxelder	2	2	1			1					1									
		Asimina triloba	pawpaw	3	2	1.5					2				1								
		Betula nigra	river birch	7	5	1.4	1							2		2	1	1					
		Carpinus caroliniana	American hornbeam	8	4	2	1			1		5							1				
		Carya ovata	shagbark hickory	2	2	1	1														1		
		Celtis laevigata	sugarberry	5	4	1.25	1			1						2						1	
		Cephalanthus occidentalis	common buttonbush	1	1	1													1				
		Cornus amomum	silky dogwood	24	6	4	1	12							1	3				4		3	
		Cornus florida	flowering dogwood	14	4	3.5					4				1	4						5	
		Corylus cornuta	beaked hazelnut	9	6	1.5	1	1	3		1	1			2								
		Diospyros virginiana	common persimmon	3	2	1.5				1										2			
		Fraxinus pennsylvanica	green ash	28	11	2.55	1			1		6	1	6	1		1		1	1	6		3
		Ilex opaca	American holly	2	1	2				2													
		Juglans nigra	black walnut	5	3	1.67			1				3	1									
		Liriodendron tulipifera	tuliptree	20	10	2	4		1	3	1	1	2					2	2		3		1
		Nyssa sylvatica	blackgum	2	1	2	2																
		Platanus occidentalis	American sycamore	18	9	2		1	1			3		1	3	1			3	1			4
		Prunus serotina	black cherry	2	1	2															2		
		Quercus alba	white oak	1	1	1												1					
		Quercus falcata	southern red oak	25	13	1.92	1	1	1	1			1		2		4	3	3	1	4	2	1
		Quercus laurifolia	laurel oak	15	9	1.67				2			2	2		1	2	3		1	1		1
		Quercus michauxii	swamp chestnut oak	29	15	1.93			3	3	3	2	2	2	1	2	2	2	1	1	1	3	1
		Quercus montana	chestnut oak	1	1	1																	1
		Quercus nigra	water oak	4	3	1.33											2		1				1
		Ulmus alata	winged elm	1	1	1													1				
TOT:	**0**	**25**	**25**	**231**	**25**		**14**	**15**	**11**	**15**	**11**	**18**	**11**	**15**	**12**	**15**	**12**	**12**	**14**	**11**	**18**	**14**	**13**

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)	-	-	-
	-	-	
	-	-	
Bare Bench (Left)	-	-	-
	-	-	
	-	-	
Bare Floodplain (Right)	-	-	-
	-	-	
	-	-	
Bare Floodplain (Left)	-	-	-
	-	-	
	-	-	
Invasive/Exotic Populations	16+50 - 17+50	Chinese privet spreading from mainstem of Little River	VPA C.6-1

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	Year 4 Totals	Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17						
Acer negundo			1					1										0	0	0	0	2	
Asimina triloba					2				1									3	3	3	3	3	
Betula nigra	1							2		2	1	1						17	15	15	8	7	
Carpinus caroliniana	1			1		5							1					4	4	4	4	8	
Carya ovata	1														1			7	4	2	2	2	
Celtis laevigata	1			1						2						1		9	8	7	4	5	
Cephalanthus occidentalis													1					0	0	0	0	1	
Cornus amomum	1	12							1	3				4		3		34	33	31	28	24	
Cornus florida					4				1	4						5		3	3	3	5	14	
Corylus cornuta	1	1	3		1	1			2									13	12	9	8	9	
Diospyros virginiana				1										2				0	0	0	0	3	
Fraxinus pennsylvanica	1			1		6	1	6	1		1		1	1	6		3	14	14	16	3	28	
Ilex opaca				2														0	0	0	0	2	
Juglans nigra			1				3	1										0	0	0	0	5	
Liriodendron tulipifera	4		1	3	1	1	2					2	2		3		1	24	19	13	18	20	
Nyssa sylvatica	2																	7	5	5	15	2	
Platanus occidentalis		1	1			3		1	3	1			3	1			4	23	17	18	5	18	
Prunus serotina															2			0	0	0	0	2	
Quercus alba												1						0	0	0	0	1	
Quercus falcata var. pagodifilia	1	1	1	1			1		2		4	3	3	1	4	2	1	28	22	23	18	25	
Quercus laurifolia				2			2	2		1	2	3		1	1		1	27	19	17	22	15	
Quercus michauxii			3	3	3	2	2	2	1	2	2	2	1	1	1	3	1	27	23	26	14	29	
Quercus montana																	1	0	0	0	0	1	
Quercus nigra											2		1				1	5	5	5	26	4	
Ulmus alata													1					0	0	1	4	1	
Ulmus americana																		2	1	1	1	0	
Stems/plot	14	15	11	15	11	18	11	15	12	15	12	12	14	11	18	14	13	247	207	199	188	231	
Stems/Acre Year 4	566	607	445	607	445	728	445	607	486	607	486	486	566	445	728	566	526						**550**
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	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

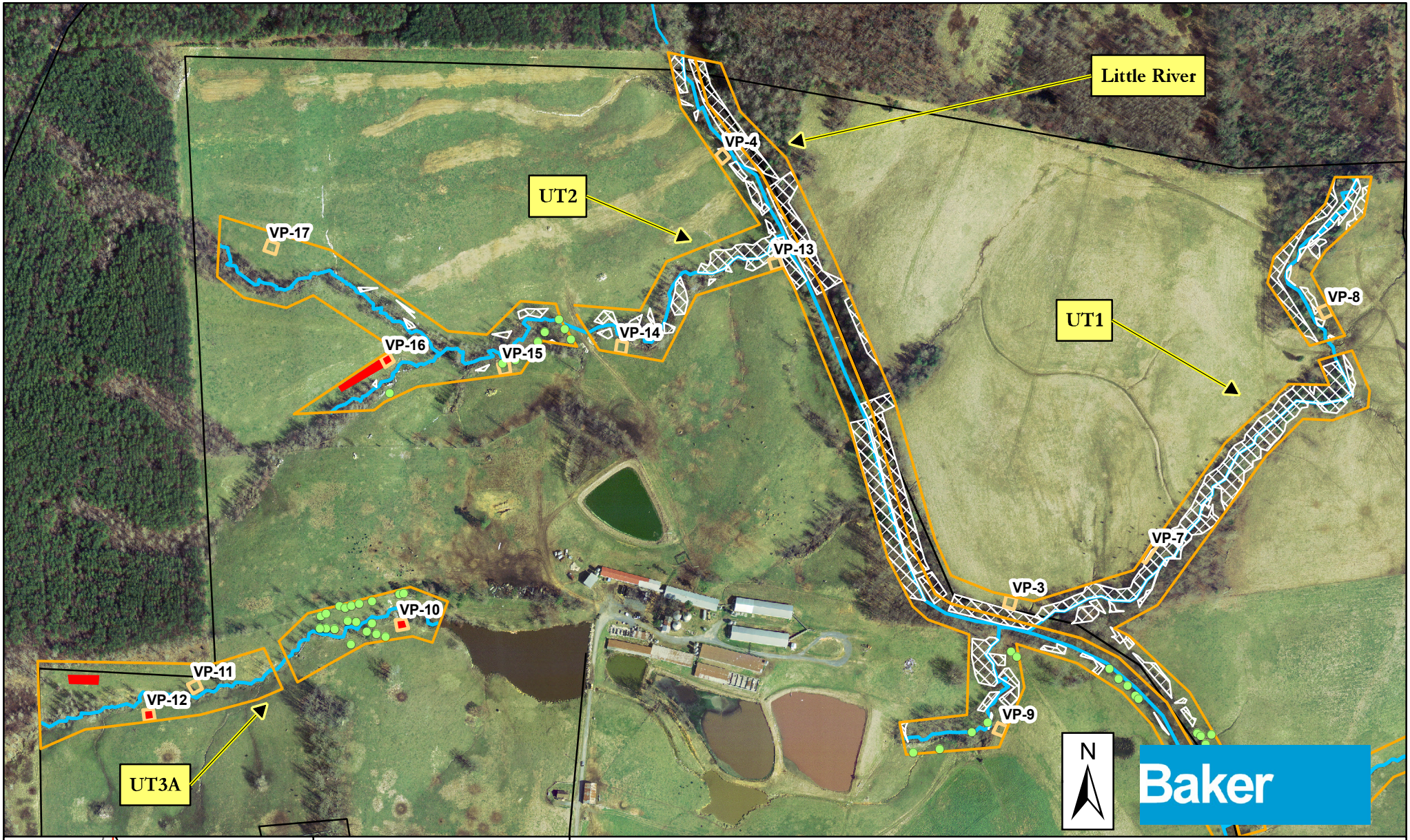
VP-14

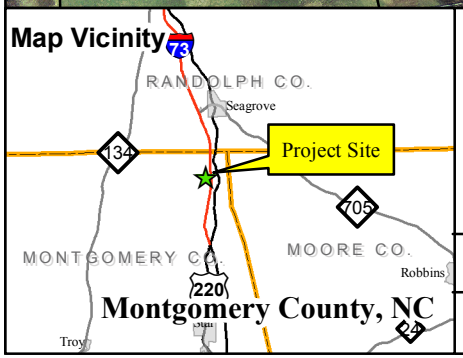
VP-15

VP-16

VP-17

VEGETATION PROBLEM AREAS
FIGURE C1





Ecosystem Enhancement PROGRAM

EEP Project No.: 000623

January 2014

Figure C1a. Vegetation Problem Areas

Little River Farm Site - Year 4 Monitoring

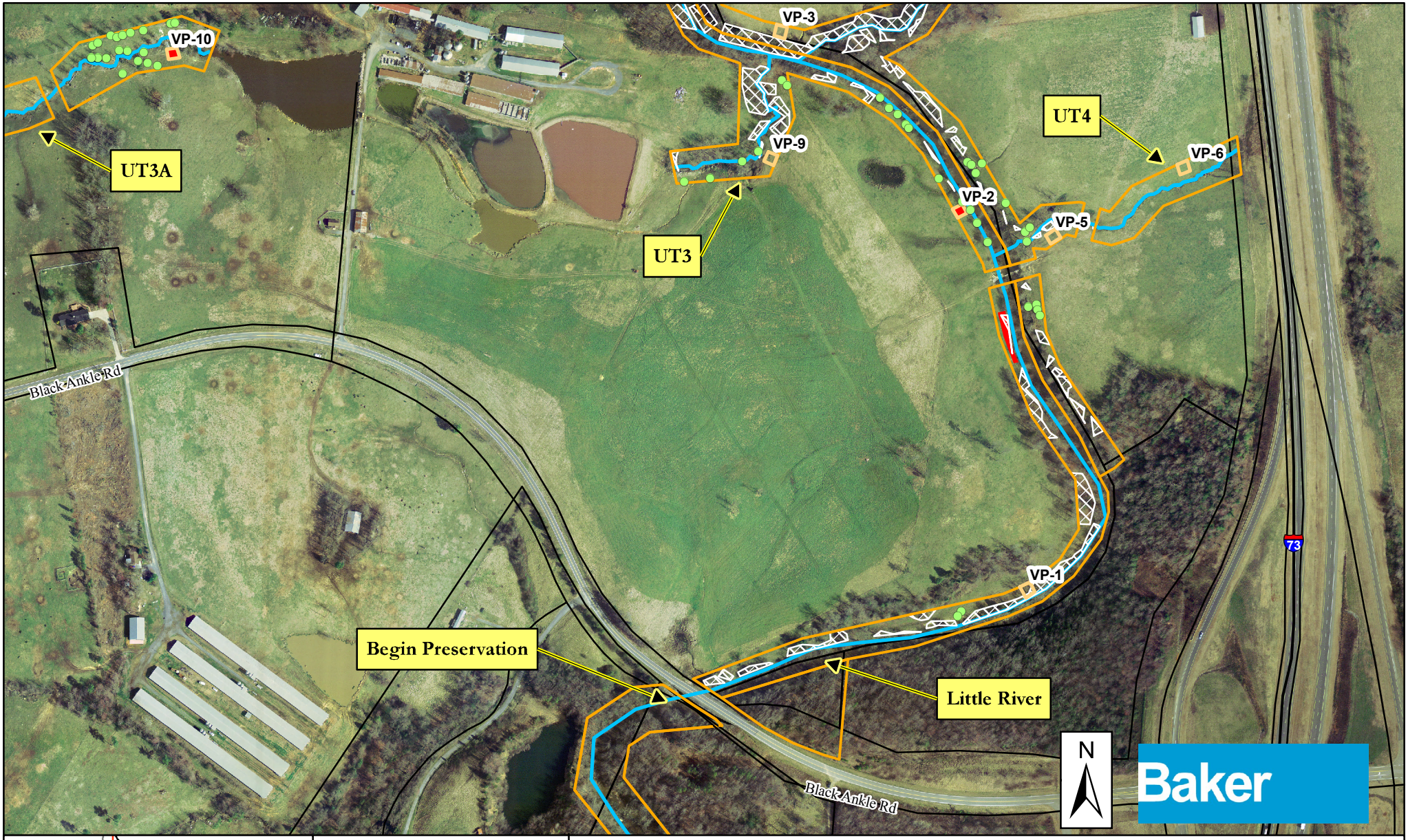
Montgomery County, NC

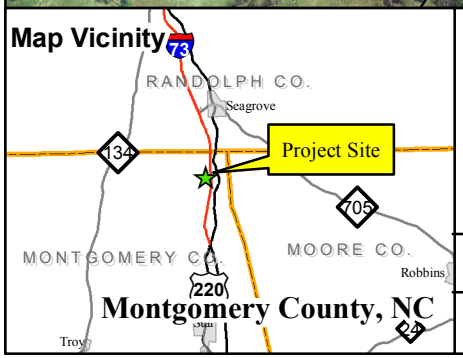
LEGEND

- Privet
- Veg Plots
- Privet
- Beaver Activity
- Streams
- Conservation Easement

0 200 400 Feet

1 inch = 400 feet





Ecosystem Enhancement Program

EEP Project No.: 000623

January 2014

Figure C1b. Vegetation Problem Areas

Little River Farm Site - Year 4 Monitoring

Montgomery County, NC

LEGEND

- Privet
- Veg Plots
- Privet
- Beaver Activity
- Streams
- Conservation Easement

0 200 400 Feet

1 inch = 400 feet

VEG PROBLEM AREA PHOTOS

VPA 1 – Chinese Privet along Right Bank of UT1

VPA 4 – Beaver Cutting on Silky Dogwood

VPA 2 – Beaver Activity

VPA 5 – Silky Dogwood Left in Floodplain by Beaver Activity

VPA 3 – Beaver Activity VP-16

APPENDIX D:
AS-BUILT PLAN SHEETS

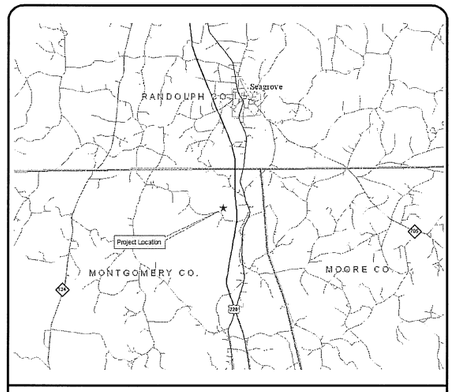
STATE	BUCK PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
NC	113115	1	16

PROJECT: 113115 LITTLE RIVER FARM

ECOSYSTEM ENHANCEMENT PROGRAM

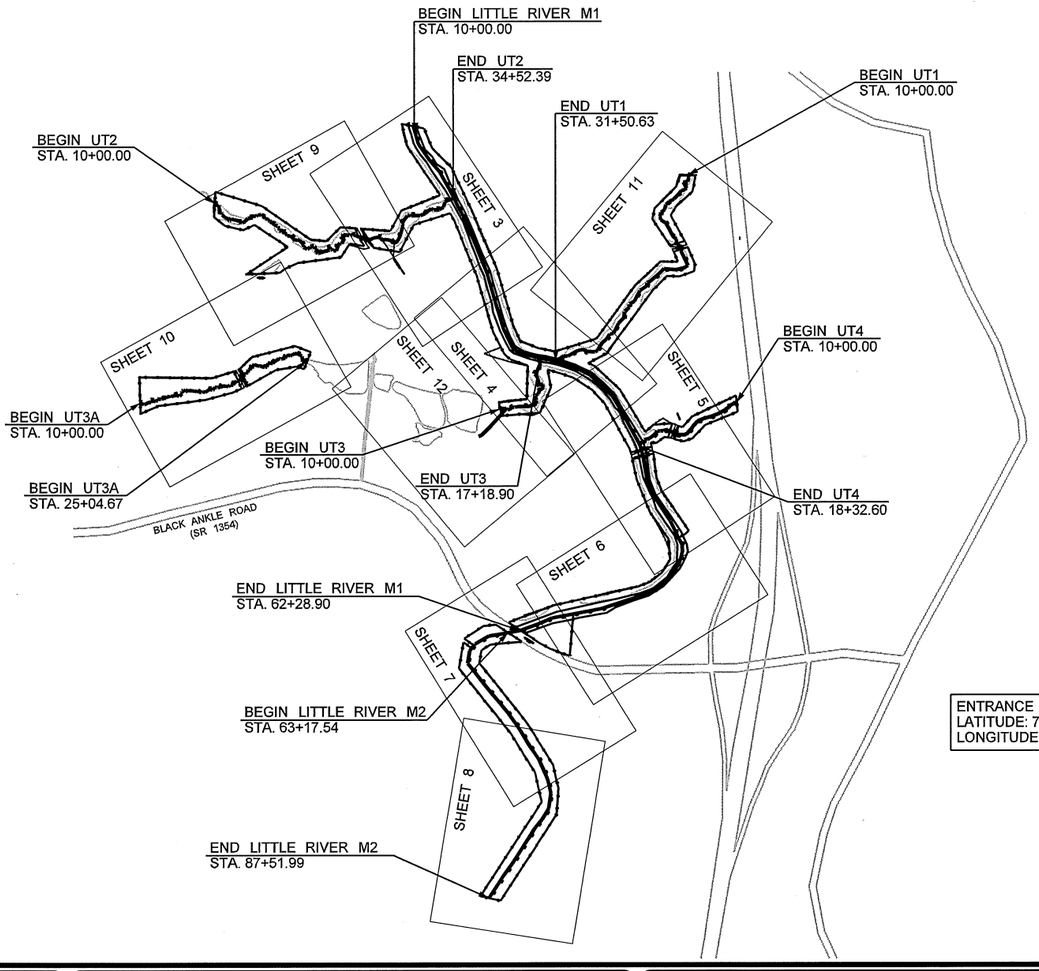
MONTGOMERY COUNTY

LOCATION: OFF US 220 AND BLACK ANKLE ROAD SR 1354
TYPE OF WORK: AS-BUILT FOR STREAM ENHANCEMENT, PRESERVATION, AND RESTORATION



VICINITY MAP

INDEX OF SHEETS



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: 919.463.5488
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:

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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
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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 — C
Prop. Slope Stakes Fill — F
Prop. Woven Wire Fence
Prop. Chain Link Fence
Prop. Barbed Wire Fence
Prop. Wheelchair Ramp — WCR
Curb Cut for Future Wheelchair Ramp — CCFR
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 — CA
Prop. Control of Access Line — CA
Exist. Easement Line — E
Prop. Temp. Construction Easement Line — E
Prop. Temp. Drainage Easement Line — TDE
Prop. Perm. Drainage Easement Line — PDE

HYDROLOGY

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

STRUCTURES

MAJOR
Bridge, Tunnel, or Box Culvert — CONC
Bridge Wing Wall, Head Wall and End Wall — CONC WW

MINOR
Head & End Wall — CONC HW
Pipe Culvert
Footbridge
Drainage Boxes — CB
Paved Ditch Gutter

UTILITIES

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

Recorded Water Line — W — W
Designated Water Line (S.U.E.*) — W — W
Sanitary Sewer — SS — SS
Recorded Sanitary Sewer Force Main — FSS — FSS
Designated Sanitary Sewer Force Main(S.U.E.*) — FSS — FSS
Recorded Gas Line — G — G
Designated Gas Line (S.U.E.*) — G — G
Storm Sewer — S — S
Recorded Power Line — P — P
Designated Power Line (S.U.E.*) — P — P
Recorded Telephone Cable — T — T
Designated Telephone Cable (S.U.E.*) — T — T
Recorded U/G Telephone Conduit — TC — TC
Designated U/G Telephone Conduit (S.U.E.*) — TC — TC
Unknown Utility (S.U.E.*) — ?UTL — ?UTL
Recorded Television Cable — TV — TV
Designated Television Cable (S.U.E.*) — TV — TV
Recorded Fiber Optics Cable — FO — FO
Designated Fiber Optics Cable (S.U.E.*) — FO — FO
Exist. Water Meter — 0
U/G Test Hole (S.U.E.*) — ATTUR
Abandoned According to U/G Record — E.O.I.
End of Information

BOUNDARIES & PROPERTIES

State Line
County Line
Township Line
City Line
Reservation Line
Property Line
Property Line Symbol — PL
Exist. Iron Pin — EIP
Property Corner
Property Monument — ECM
Property Number — 123
Parcel Number — 6
Fence Line — WW & ISBW
Existing Wetland Boundaries — WLB
High Quality Wetland Boundary — HQ WLB
Medium Quality Wetland Boundaries — MQ WLB
Low Quality Wetland Boundaries — LQ WLB
Proposed Wetland Boundaries — WLB
Existing Endangered Animal Boundaries — EAB
Existing Endangered Plant Boundaries — EPB

BUILDINGS & OTHER CULTURE

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

TOPOGRAPHY

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

VEGETATION

Single Tree
Single Shrub
Hedge
Woods Line
Orchard
Vineyard — VINEYARD

RAILROADS

Standard Gauge — CSX TRANSPORTATION
RR Signal Milepost — MILEPOST 35
Switch — SWITCH

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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:

Baker

Michael Baker Engineering Inc.
8000 Regency Parkway
Suite 200
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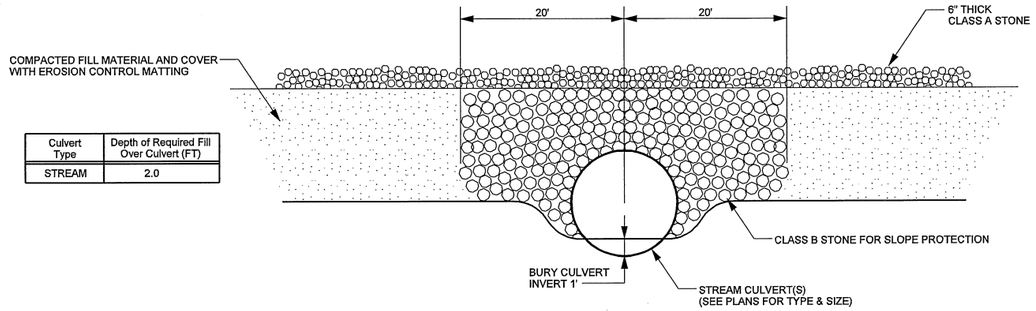
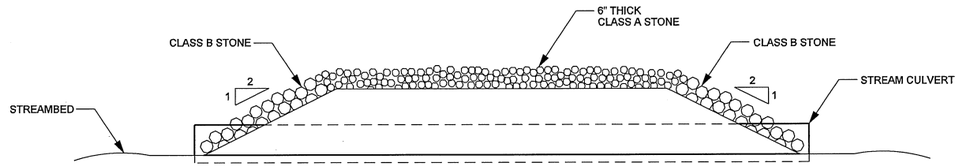
Phone: 919.463.5488
Fax: 919.463.5490

PERMANENT ROAD CULVERT CROSSING



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

PROFILE VIEW ALONG ROAD



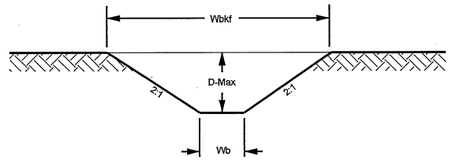
CROSS SECTION

NOTES:

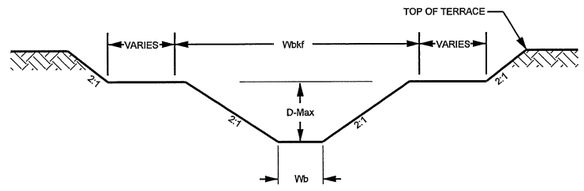
1. APPLY SUFFICIENT FILL OVER CULVERTS TO PREVENT CULVERT COLLAPSE.
2. PLACE CLASS B STONE ON SIDE SLOPES OF ROAD FILL WITH 20' OF COVER. STABILIZE REMAINING ROAD SIDE SLOPES WITH EROSION MATTING ACCORDING TO SPECIFICATIONS.

CROSS SECTION

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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2/26/03

PROJECT REFERENCE NO.	SHEET NO.
113115	2-A

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN L. TWEEDY

APPROVED BY:

10-20-09

DATE:

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Phone: 919.463.5488
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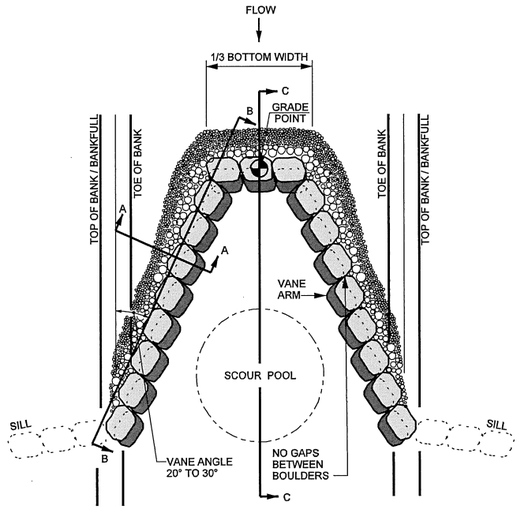
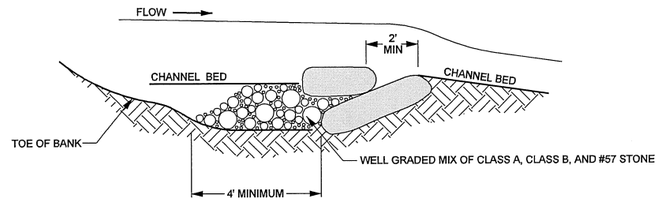
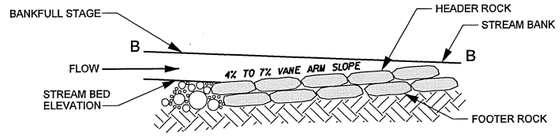
ROCK CROSS VANE

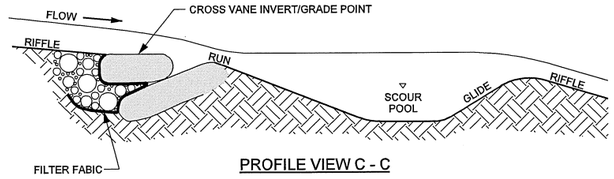




SECTION A - A



PROFILE VIEW B - B
VANE ARM

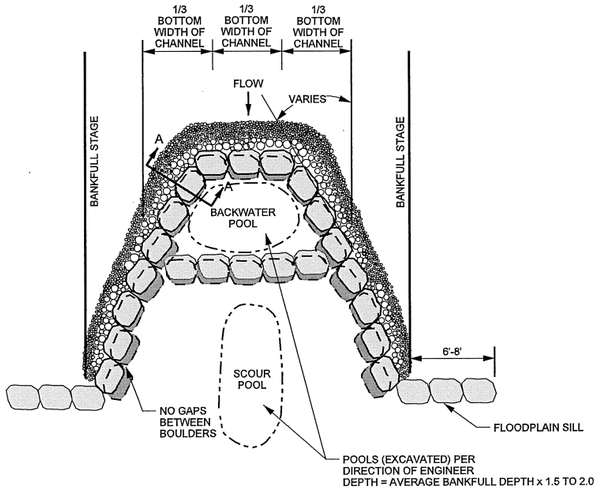


PROFILE VIEW C - C

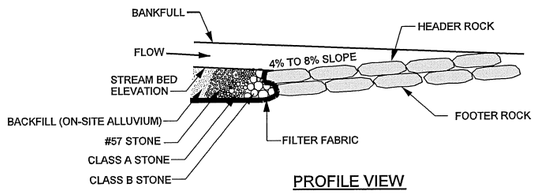
NOTES FOR ALL VANE STRUCTURES:

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.

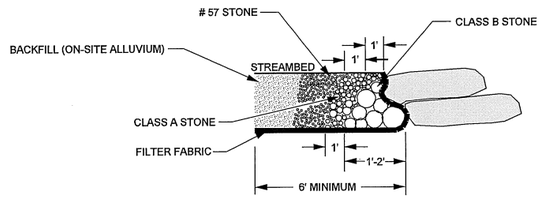
DOUBLE DROP ROCK CROSS VANE



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.

10/20/2009
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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. TWEDDY

APPROVED BY:

10-20-09

DATE:

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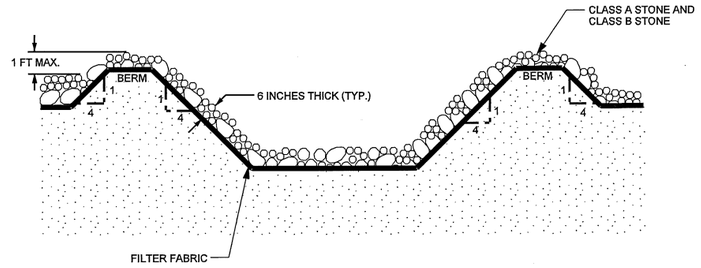
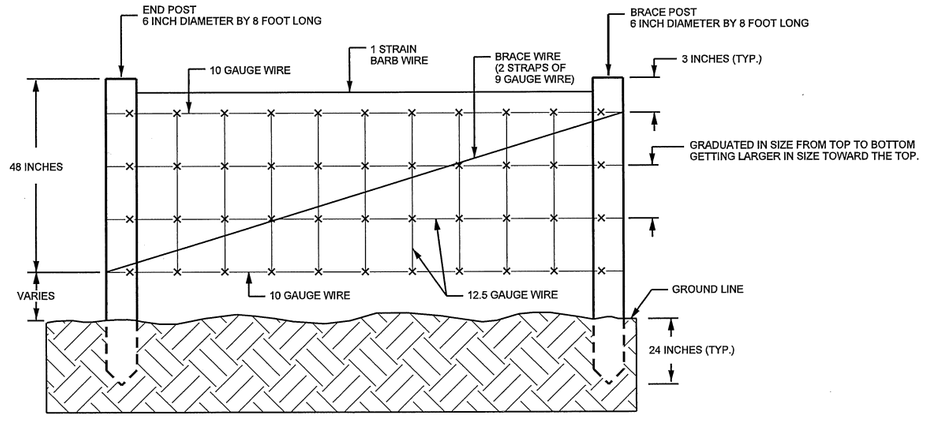
PERMANENT FORD STREAM CROSSING



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

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

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)

2/26/03

10/20/2009
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2/26/03

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

END UT1
STA. 31+50.63

VEG PLOT #3

END UT3
STA. 17+18.90

VEG PLOT #9

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)

10/20/2009
R:\113115\design\as-built\113115_asb_04.dgn

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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10-20-09

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Fax: 919.463.5490

BEGIN UT4
STA. 10+00.00

PHOTO POINT #1

PHOTO POINT #2

PHOTO POINT #3

CROSS SECTION 1
RIFFLE
STA. 11+35.00

PHOTO POINT #4

PHOTO POINT #5

PHOTO POINT #6

PHOTO POINT #7

CROSS SECTION 2
POOL
STA. 13+33.00

PHOTO POINT #8

PHOTO POINT #9

PHOTO POINT #10

CREST GAUGE

INSTALLED 16' GATE

UT4 CROSSING
PHOTO POINT

INSTALLED 16' GATE

REMOVED CONCRETE CROSSING AND
INSTALLED PERMANENT FORD CROSSING

PHOTO POINT #11

INSTALLED 16' GATE

INSTALLED 16' GATE

END UT4
STA. 18+82.00

VEG PLOT #6

VEG PLOT #5

VEG PLOT #2

NAD 83

MATCHLINE SHEET 4 LITTLE RIVER STA. 36+00.00

MATCHLINE SHEET 6 LITTLE RIVER STA. 47+00.00

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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BUCK PROJECT REFERENCE NO.	SHEET NO.
113115	6

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN L. TWEEDY

APPROVED BY:

10-20-09

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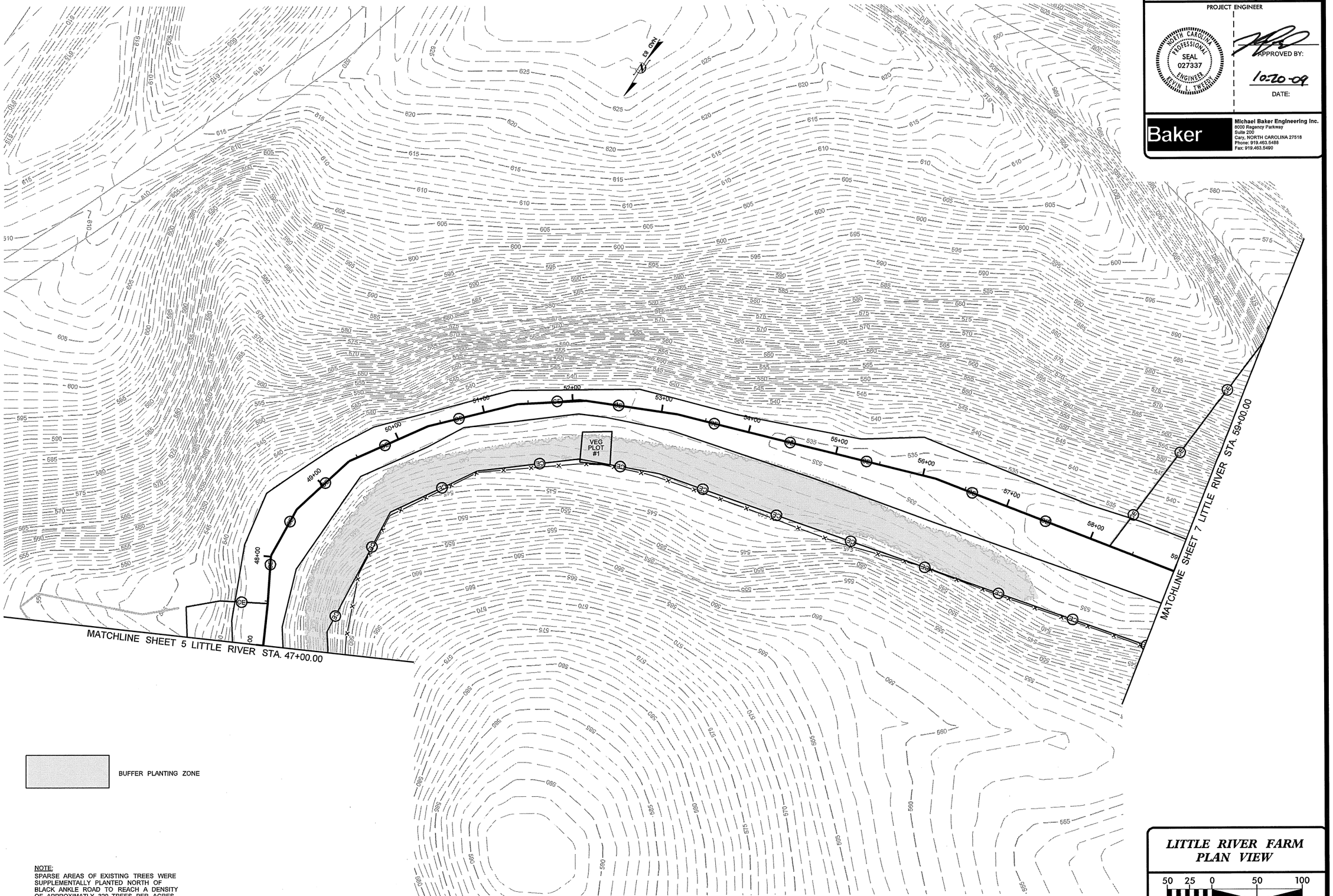
Fax: 919.463.5490



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	7

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN L. TWEDDY

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10-20-09

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Fax: 919.463.5490

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

APPROVED BY:

10-20-09

DATE:

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Fax: 919.463.5490

MATCHLINE SHEET 7 LITTLE RIVER STA. 76+50.00

77+00 78+00 79+00 80+00 81+00 82+00 83+00 84+00 85+00 86+00 87+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. TWEDT

APPROVED BY:

10-20-09

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Phone: 919.463.5488
Fax: 919.463.5490

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 ADDTIONAL 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

APPROVED BY:

10-20-09

DATE:

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Phone: 919.463.5488
Fax: 919.463.5490

NAD 83

BEGIN UT3A
STA. 10+00.00

VEG PLOT #12

VEG PLOT #11

UT3A CROSSING PHOTO POINT

INSTALLED 16' GATE

INSTALLED 30" RCP CULVERT - 20' LONG
UPSTREAM INVERT = 616.01'
DOWNSTREAM INVERT = 615.73

INSTALLED 16' GATE

VEG PLOT #10

END UT3A
STA. 25+04.67

BUFFER PLANTING ZONE

LITTLE RIVER FARM
PLAN VIEW

50 25 0 50 100
SCALE (FT)

10/29/2009
R:\113115\Design\as-built\113115_asb_10.dgn

PROJECT REFERENCE NO.	SHEET NO.
113115	11

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 027337 ENGINEER KEVIN L. TWEDT

APPROVED BY:

10-20-09

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Fax: 919.463.5490

US ROUTE 220

INSET A

DETENTION BASIN

NAD 83

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

VEG PLOT #7

BEGIN UT1
STA. 10+00.00

10+00
11+00
12+00
13+00
14+00
15+00
16+00
18+00
19+00
20+00
21+00
22+00
23+00
24+00
25+00
26+00

BUFFER PLANTING ZONE

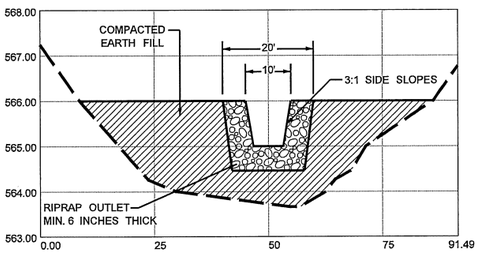
INSET A

FLOW

DETENTION BASIN

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. TWEEDY

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10-20-09

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Fax: 919.463.5490

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
M:\113115\Design\as-built\113115_eab_12.dgn

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 - 1 (12/11/2013)

UT4 Crest Gauge - 2 (12/18/2013)