Fletcher-Meritor Site
(UT to Cane Creek) Stream and Wetland Restoration
Project No: 138

Baseline Monitoring Document and As Built Baseline Report

Henderson County, North Carolina

Prepared for:

North Carolina Department of Environmental and Natural Resources
Ecosystem Enhancement Program
1601 Mail Service Center
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EXECUTIVE SUMMARY

The Fletcher-Meritor Site Stream and Wetland Restoration Project, completed in May 2012, restored 3,617 linear feet of meandering C/E-type stream along an Unnamed Tributary (UT) to Cane Creek plus 648 linear feet of a first order tributary (Tributary) to the Main Stem as well as re-establish hydrology and hydrophytic vegetation to 6.7 acres of historical wetlands. This natural channel restoration consists of a Priority II restoration that includes a bankfull bench to allow for flood attenuation before reconnecting to the natural floodplain. The riparian buffer was planted with species representing an Alluvial Forest grading to a Bottomland Forest Community (Schafale and Weakley, 1990). This stream was preserved within the 20.3 acre conservation easement.

Efforts to restore or enhance wetlands on the project site included restoring topography, hydrology, and habitats of a natural wetland system by excavating overburden/berms and filling agricultural ditches to promote an increase in ground water elevation. Following excavation, removal of drain tiles and plugging of drainage ditches, the wetland areas were planted with native hardwoods.

The project is located in the French Broad River Basin, USGS Hydrologic Unit Code (HUC) 06010105 and NCDWQ subbasin 04-03-02. The stream reach is ungauged, with the nearest USGS gage station within the HUC, #03447687 (35°25.73' N, 82°33.17'), located on the French Broad River just upstream of the Cane Creek confluence, near Fletcher, North Carolina.

The project goals and objectives are listed below.

Project Goals

- Improve local water quality by reestablishing stream stability and capacity to transport watershed flows and sediment load.
- Provide additional floodplain storage by increasing the capacity of the stream to mitigate flood flows.
- Restore aquatic and riparian habitat.
- Reducing non-point source sedimentation and nutrient inputs into the project reaches.

Project Objectives

- Restore/enhance approximately 4,288 linear feet to stable stream channel morphology, supported by instream habitat and grade/bank stabilization structures. Restoration and enhancement consists of restoring the channel pattern and profile and building a floodplain bench along the reaches.
- Reestablish hydrology and hydrophytic vegetation to 6.7 acres of historic wetlands by removing overburden/berms, plugging agricultural drainage ditches, and replanting with native grasses, shrubs and trees.
- Eliminate accelerated bank erosion by creating a bankfull bench, floodplain, and laying back slopes.
- Reestablish a native riparian buffer. Revegetation of the buffer was accomplished by planting tree and shrub species for alluvial and Bottomland Hardwood Communities.

The project has been divided into segments which include three stream reaches and four wetland areas:

- Upper Reach Main Stem– 1838 linear feet
- Lower Reach Main Stem– 1779 linear feet
- Tributary – 648 linear feet
- Wetland A – approximately 2.92 acres
- Wetland B – approximately 1.43 acres

- Wetland C – approximately 1.34 acres
- Wetland D – approximately 0.97 acres

The project site, which is protected by a 20.3-acre permanent conservation easement held by the State of North Carolina, is situated in Henderson County in the North Carolina Mountains Physiographic Province. Cane Creek is a North Carolina Class C stream that is listed on the 303(d) list as ecologically/biologically impaired upstream of US 25 (NCDWQ 2012). In addition, restored reaches drain lands with significant non-point source impacts to water quality from agriculture, industrial/commercial development, and historical clay strip mining. Land Use / Land Cover data indicates that more than 60 percent of the 1.1-square mile UT to Cane Creek watershed is currently pervious with the dominance of open fields/lawn/low-density residential lands, and about 40 percent is impervious commercial/institutional buildings/roads.

The riparian buffer was planted with species representing an Alluvial Forest grading to a Bottomland Forested Community as defined in the *Classification of the Natural Communities of North Carolina, Third Approximation*, by M.P. Schafale and A.S. Weakley (1990).

The baseline monitoring conducted in September 2012 established the stream and vegetation monitoring components. The stream monitoring consists of a full longitudinal profile of the restored reaches, and nine cross-sections, six riffles and three pools. Seventeen vegetation monitoring plots were established throughout the planted riparian buffer. These plots will be monitored every year according to the latest CVS-EEP vegetation monitoring protocol. The site will be monitored for at least five years or until the success criteria are met. The first year of monitoring will be in May 2013.

Several factors have been determined to be worthy of future attention on the site. These include backwater effects from Cane Creek during large precipitation events, beaver monitoring due to past removal onsite and presence upstream, vegetation planted outside the planting window as well as future plans by the Town that may impact the project area such as proposed sewer lines and development of the park with multiple uses.

1.0 PROJECT GOALS, BACKGROUND, AND ATTRIBUTES

1.1 Location and Setting

The Fletcher-Meritor Site (UT to Cane Creek) Stream and Wetland Restoration Project is located in Henderson County, near the town of Fletcher, North Carolina (Figure 1, Appendix A). The 93-acre restoration property tract, owned by the Town of Fletcher and State of North Carolina, is located approximately 500 feet to the west of US 25 and along the north side of Rockwell Drive within the 100-year floodplain of Cane Creek, which drains to the French Broad River (Figure 2). The stream and wetland restoration project extends approximately 3,617 linear feet upstream of confluence with Cane Creek. In addition, approximately 648 linear feet of a tributary to the Main Stem and 6.7 acres of historic wetlands were restored within the EEP conservation easement.

The United States Geological Survey (USGS) 8-digit Hydrologic Unit Code (HUC) is 06010105 within the North Carolina's Division of Water quality (NCDWQ) subbasin 04-03-02 (French Broad River). Cane Creek has been identified by EEP as one of 14 local watersheds (TLWs) in the French Broad 05 River Basin (FB 06010105) with the greatest need and opportunity for stream and wetland restoration efforts and has been given higher priority than non targeted watersheds for implementation of EEP restoration projects (reference DWQ Subbasin Report).

This project site has been under continuous agricultural production for more than 50 years. The project reach was extensively channelized with little or no riparian vegetation along the channels and historical floodplain wetlands have been drained. The unnamed tributaries exhibited bed incision as well as areas of bank instability and sediment erosion. Stream stability was validated using Rosgen Level III methodologies including the Bank Erosion Hazard Index (BEHI). BEHI scores indicated that sediment supply is high from severely eroding banks mostly concentrated where the channel is constricted and outside of meander bends. Cross-section information for the tributaries indicated entrenchment and V/U-shaped channels are both indicative of track hoe or backhoe operations that have cut and maintained these channels over time.

Two reference reaches were used in the design process, Orton Branch in Buncombe County and UT to Little River in Transylvania County (Figures 4a and 4b). Based on the reference reaches and existing site conditions, a Priority II approach was utilized for restoration. A Priority I restoration reconnecting the existing channels to their natural floodplain was preferred; however, given the moderately high incised banks at the downstream confluence of Cane Creek and the general low-gradient of the existing channel, Priority I could not be achieved. Priority II restoration established a bankfull bench along a meandering channel to allow for flood attenuation before reconnecting to the natural floodplain.

1.2 Goals and Objectives

This restoration project aimed at restoring degraded sections of UT to Cane Creek Main Steam and Tributary to a stable channel using natural channel restoration methodologies. Upstream of its confluence with Cane Creek, approximately 3,640 linear feet the UT to Cane Creek Main Stem plus 648 linear feet of Tributary was to be restored to a meandering C/E-type stream consisting or Priority II restoration. Priority II restoration includes establishing a bankfull to allow of flood attenuation before reconnecting to the natural floodplain. Due to unforeseen conflicts with original design and recorded property easements, a

small portion of the Main Stem length was reduced to fit within available easement. A greenway right of way, which was not recorded on Town plat, necessitated a reduction in stream length at the end of the project (confluence of the UT to Cane Creek with Cane Creek). However, a stable confluence was constructed and stream banks planted with native grasses, trees, and shrubs. This resulted in a constructed Main Stem length of 3,617 linear feet as opposed to the 3,640 originally planned.

Hydrology and hydrophytic vegetation along the floodplain was re-established to restore approximately 6.7 acres of historic wetlands.

Project Goals

- Improve local water quality by reestablishing stream stability and capacity to transport watershed flows and sediment load.
- Provide additional floodplain storage by increasing the capacity of the stream to mitigate flood flows.
- Restoring wetlands for flood attenuation and water quality benefits.
- Restore aquatic and riparian habitat.
- Reducing non-point source sedimentation and nutrient inputs into the project reaches.

Project Objectives

- Restore approximately 3,640 linear feet the UT to Cane Creek Main Stem plus 648 linear feet of Tributary to stable stream channel morphology, supported by instream habitat and grade/bank stabilization structures. Restoration and enhancement consists of restoring the channel pattern and profile and building a floodplain bench along the reaches.
- Reestablish hydrology and hydrophytic vegetation to 6.7 acres of historic wetlands by removing overburden/berms, plugging agricultural drainage ditches, and replanting with native grasses, shrubs and trees.
- Eliminate accelerated bank erosion by creating a bankfull bench, floodplain, and laying back slopes.
- Reestablish a native riparian buffer. Revegetation of the buffer was accomplished by planting tree and shrub species for alluvial and Bottomland Hardwood Communities.

1.3 Project Structure, Restoration Type, and Approach

The project involved restoration of 4,288 linear feet of stream, restoring 6.7 acres of historic wetland, and replanting of 18.59 acres. A recorded conservation easement consisting of 20.3 acres will protect the stream reach and riparian buffers in perpetuity. Refer to Table 1 (Appendix A) and Figure 3 (Appendix D) for a table and detailed plan view of the project components.

Main Stem Upper Reach, from eastern project boundary to its confluence with Tributary – Priority 2

The Upper Reach of the Main Stem extended 1,838 linear feet from the eastern project boundary downstream to where the Tributary ties into the Main Stem. The Upper Reach of the Main Stem of UT to Cane Creek was restored using a Priority II approach. Historically this reach was primarily used as an agricultural ditch and contained very few natural channel morphological characteristics. The Town of Fletcher owns the adjacent agricultural fields and has been developing future plans for the parcel; however, the fields currently remain in agricultural production.

The restoration resulted in the removal of the ditched stream section with unstable banks and created a stable C/E-type channel with a bankfull bench which provides attenuation of higher storm flows and reduces stress and potential bank erosion. The vertical alignment reestablished riffle and pool bed structures increasing lateral and vertical stability and enhancing aquatic habitat. The installation of cross vanes and artificial sills provided grade control along the reach.

Main Stem Lower Reach, from confluence with Tributary to its confluence with Cane Creek – Priority 2

From the Tributary tie-in extending downstream to Cane Creek, the Lower Reach included 1,779 linear feet of restored stream. The Lower Reach of the Main Stem was restored using a Priority II approach. Historically this reach was primarily used as an agricultural ditch and contained very few natural channel morphological characteristics. The Town of Fletcher owns the adjacent agricultural fields and has been developing future plans for the parcel; however, the fields currently remain in agricultural production.

The restoration resulted in the removal of the ditched stream with unstable banks and created a stable C/E-type channel with a bankfull bench which provides attenuation of higher storm flows and reduces stress and potential bank erosion. The vertical alignment reestablished riffle and pool bed structures increasing lateral and vertical stability and enhancing aquatic habitat. The installation of cross vanes and artificial sills provided grade control along the reach.

Tributary, from Rockwell Road to its confluence with the Main Stem UT of Cane Creek – Priority 2

The Tributary reach extends 648 linear feet from the culvert under Rockwell Road to the confluence with the Main Stem of UT to Cane Creek. Similar to the Main Stem, the Tributary has been historically straightened for agricultural use and restored using a Priority II restoration. The Tributary was restored to a C/E-type stream and established a bankfull bench. In-stream structures including cross vanes and single arm vanes were installed to provide grade control as well as protect stream banks. Step down structures were installed to provide an acceptable average slope while meeting elevations set by the upstream culvert under Rockwell Road and downstream tie-in with the Main Stem.

Wetlands A, B, C, and D

Four wetland areas totaling approximately 6.7 acres were restored along the UT to Cane Creek Main Stem. Approximately 5.69 acres of bottomland forest was restored south of the Main Stem reaches. The wetland areas will assist in floodplain detention and will restore hydrology and vegetation to an area that was historically ditched and drained for agricultural production. In addition, the restoration restored approximately 0.97 acres of bottomland forest to the north of the Lower Reach by plugging the ditch and revegetating the area. This restored wetland area will assist with the flows of the ditch across the field by reducing stormwater velocities and nutrient loading that may discharge into the stream from the previous agricultural activities.

Targeted Buffer Communities

The riparian buffer was planted with species representing an Alluvial Forest grading to a Bottomland Forest Community as defined in the *Classification of the Natural Communities of North Carolina, Third*

Approximation, by M.P Schafale and A.S Weakley (1990). The buffer area adjacent to the stream reach was divided up into three zones (Stream Bank, Floodplain, and Bottomland Wetlands).

1.4 History, Contacts and Attribute Data

The project was initiated by the EEP in the summer of 2004. The final stream restoration plan was developed by HDR Engineering, Inc. of the Carolinas (HDR Engineering) in February 2008. The final design of the project was completed in April 2011 by HDR Engineering. Buchanan Brothers Inc. began construction in December 2011 and complete construction in May 2012. Habitat Assessment and Restoration Program, Inc (HARP) completed planting in April 2012. Refer to Tables 2-4 in Appendix A for additional project and contact details.

2.0 SUCCESS CRITERIA

Channel stability and vegetation survival will all be monitored annually on the project site. Post-restoration monitoring will be conducted for a minimum of five years or until the success criteria are met following the completion of construction.

2.1 Morphometric Parameters and Channel Stability

Considering the typical 5-year timeframe for mitigation monitoring, the determination of success for stream projects is often based primarily on the degree of morphological stability. The absence of any change over these timeframes will certainly be interpreted as stability, but is not a pre-requisite. To the contrary, it is typical for streams to demonstrate variation over a 5-year monitoring period in the form of sustainable rates of change or stable patterns of variation (dynamic stability). Considering the young state of woody buffers and the fact that design parameters are estimates and therefore never a perfect match for the watershed regimes, restored streams typically adjust or shift to some extent after their exposure to varying flows in the years that immediately follow construction. However, these changes should be moderate and exhibit little discernable trends. Annual variation is to be expected, but over time and with buffer development should generally demonstrate a reduction in amplitude and demonstrate dynamic maintenance around some central tendency that represents acceptable distributions for design parameters and/or stable stream types. Key among these are those parameters that indicate lateral and vertical stability and intended levels of floodplain connection. If some trends or patterns become evident, they should be modest or indicate migration toward another stable form. Lastly, all of this must be evaluated in the context of hydrologic events to which the system is exposed over the monitoring period.

2.1.1 Dimension

Dimensional stability will be based on comparisons of overlays of annual cross-section plots and their calculated parameters to the as-built conditions, design distributions, and distributions for stable stream types. Parameters such as cross-sectional area and the channel's width to depth ratio should demonstrate modest overall change and patterns of variation that are in keeping with above description of dynamic stability. The stream dimension should not demonstrate trends of enlargement either through downcutting or widening; however, modest year-to-year variation or oscillation in channel elevation or width demonstrating maintenance around baseline or design distributions is acceptable. Changes from depositional processes resulting in the development of constructive features on the banks and floodplain,

such as an inner berm, channel narrowing, natural levees, and general floodplain deposition will be acceptable forms of change and indicative of stability.

The entire project will also be visually cataloged for areas of bank instability and represented as proportions of overall bank footage. The overall proportion, severity, spatial distribution, and temporal trends in this parameter will be assessed to serve as an additional indicator of dimensional stability. In general, stability proportions (stable bank/total bank) below 85% would be of concern. Considering temporal trends, a higher percentage in a given year may also be of concern if it represents a data point in a trend of decreasing stability. Instability dominated by surface scour versus mass wasting would be an example of differing severity and the latter would be more concerning than the former. Erosion in meanders versus riffle reaches would generate differing levels of concern because erosion in the former is more likely given greater bank shear stress, whereas instability concentrated in riffle/run reaches might be more indicative of an overall design flaw.

2.1.2 Pattern and Profile

Reach profiles should not exhibit any consistent trends in thalweg degradation over any significant continuous portion of its length. Some aggradation will be acceptable and will not be actionable unless it is apparently causal for widening/bank erosion. Over the monitoring period, the profile should also demonstrate the maintenance or development of bedform (facets) more in keeping with reference level diversity and distributions for the stream type in question. It should also provide a meaningful contrast in terms of bedform diversity against the pre-existing condition. Bedform distributions, riffle/pool lengths and slopes will vary, but should do so with maintenance around design/as-built size distributions. This requires that the majority of pools are maintained at greater depths with lower water surface slopes and riffles are shallower with greater water surface slopes.

2.1.3 Substrate

Since the streams throughout the project site are dominated by sand-size particles, pebble count procedures would not show a significant change in bed material size or distribution over the monitoring period; therefore, as per NCEEP, bed material analyses will not be undertaken for this project.

2.1.4 Sediment Transport

Sediment transport evaluations will not be undertaken during the five-year monitoring period.

2.1.5 Vegetation

The vegetative success of the restoration site will be based on criteria established in the USACE Stream Mitigation Guidelines (2003). Vegetation monitoring will be considered successful if a minimum of 260 planted stems/acre are surviving at the end of five years. The interim measure of vegetative success for the site will be the survival of a minimum of 320 planted stems/acre in year three. During monitoring, any encroachments into the conservation easement should be reported to NCEEP and remediated.

2.1.6 Hydrology

Two bankfull events must be documented within the five-year monitoring period. The two bankfull events must occur in separate years. A crest gauge was installed along the reach on September 18, 2012. Other signs of bankfull flow including wrack lines, sediment deposition, and actual observance of flow will also be noted as documentation of bankfull events.

3.0 MONITORING PLAN GUIDELINES

3.1 Hydrology

a. Wetland – Measurement of wetland hydrology will be performed in accordance with traditional methods. Groundwater gauges will be installed at appropriate locations to characterize the degree of attainment of the reference hydrology.
b. Stream – Minimally, every stream project must include a crest gauge to verify on site occurrence of bank full events. Each site visit must include documentation of the highest stage for the monitoring interval and a reset of the device. Crest gauges are located approximately midway on the Upper Reach and approximately midway on the Tributary.

3.2 Dimension

Nine permanent cross-sections (5 riffles, 3 pools) have been installed along the project reaches (Main Stem and Tributary). Cross sections were marked on both banks with permanent conduit. A common benchmark was established for cross-section to facilitate comparison of year-to-year data. The annual cross-section survey will include points measured at all breaks in slope including top of bank, bankfull, edge of water, and thalweg if the features are present. Dimensional data will be compared from year to year to ensure project stability. Refer to Figure 3 in Appendix A for locations of the cross-sections.

3.3 Pattern and Profile

Pattern measurements were taken for the as-built condition and are documented in this report. Future pattern measurements will not be taken unless there is evidence that significant geomorphological adjustments have occurred. The as-built stream lengths are as follows:

- Upper Reach Main Stem – 1838
- Lower Reach Main Stem – 1779 linear feet
- Tributary – 648 linear feet

A longitudinal profile will be completed each year of the monitoring period for the entire length of the restored channel. 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, and glide).

3.4 Substrate

Since the streams throughout the project site are dominated by sand-size particles, pebble count procedures would not show a significant change in bed material size or distribution over the monitoring period; therefore, as per NCEEP, bed material analyses were not undertaken for this project.

3.5 Sediment Transport

As noted previously, additional sediment transport analyses will not be conducted during the five year monitoring period.

3.6 Visual Assessment

A visual assessment of the streams to include an assessment of the bank, bed, easement boundary, and site vegetation will be completed each year to document the necessary parameters required for the EEP monitoring report. Visual assessment will summarize performance percentages and structural feature categories. Visual vegetation assessment will summarize and catalog the extent and type of vegetation issue areas as compared to the total planted acreage within the project site.

3.7 Vegetation

Seventeen 10m x 10m ($100m^2$) vegetation sample plots will be quantitatively monitored for a minimum of five years. The plots will be monitored as per the CVS-EEP Protocol for Recording Vegetation, Version 4.2 (CVS-EEP 2008) at Level II. Refer to Figure 3 in Appendix A for the locations of the vegetation plots. Any vegetative problem areas in the project will be noted and reported in each subsequent monitoring report. Vegetative problem areas may include areas that either lack vegetation or include populations of exotic vegetation.

3.8 Photo Stations

Fifty-two representative photo station points have been identified and located using GPS for the stream reaches. The stations are shown on Figure 3 in Appendix A. Generally, the stations are set up along the outside of each meander bend. Two photos will be taken, upstream and downstream, at each location at approximately the same time each year (late April – mid May).

3.9 Watershed

Any changes to land use in the watershed that could result in changes to flow within the project streams will be assessed annually throughout the monitoring period. Any large hydrologic events in the watershed, such as tropical storms or hurricanes, will also be documented.

3.10 Monitoring Plan View

A plan view of the monitoring scheme is presented in Figure 3 in Appendix A.

3.11 Maintenance and Contingency Plans

Problem areas at the restoration site will be dealt with accordingly based on the severity of the problem and at the discretion of the EEP. Site maintenance may include reinstallation of coir matting, removal of debris from the channel, stabilization of bank erosion with protective structures, invasive species control, or adjustments to in-stream structures. All maintenance activities will be documented in the yearly monitoring reports.

4.0 AS-BUILT CONDITIONS/BASELINE (YEAR 0)

Site grading was complete in May 2012. Planting was completed in April 2012 and the baseline vegetation data collection occurred on September 2012. The as-built survey was completed by Terminus Land Surveying, PLLC on June 12, 2012. Morphological surveying was completed by HDR Engineering on September 18 and 19, 2012. The As-Built Plan View is located in Appendix D.

4.1 Profile

The entire length of the reaches were plotted by HDR using a total station to assess baseline conditions. Multiple parameters were located including top of bank, thalweg, and water surface. The longitudinal profiles are shown in Appendix B. No significant deviations from profile design and construction were noted in the baseline measurements.

4.2 Dimension

Information for nine cross sections was collected by HDR staff on September 18 and 19, 2012. The baseline morphological data is presented in Tables 5 and 6 in Appendix B, along with the cross-sectional data. The channel cross-section dimensions lie within the design parameters for this reach.

4.3 Pattern

The pattern of the channels were obtained during the as-built survey and the baseline morphology survey. The location is illustrated on the component map (Figure 3) in Appendix A as well as in the As-Built plan sheets in Appendix D. Morphological calculations are included in Table 5 in Appendix B.

4.4 Substrate

Pebble counts were not taken during baseline monitoring. The stream is a sandbed stream and pebble counts will not be taken during future monitoring events.

4.5 Sediment Transport

Sediment transport analyses will not be conducted during the five year monitoring period.

4.6 Verification of Plantings

HDR staff completed the baseline vegetation monitoring on September 17 and 18, 2012. Monitoring was conducted in 17 vegetation plots. Three plots occur adjacent to the Tributary, seven plots occur along the Upper Reach and seven along the Lower Reach. The plots are all each 10x10 meter plots.

According to the data collected, the average plant density among the 17 plots is 381 stems/acre with the range from 203 to 608 stems/acre. The highest plant density occurred in plot 4 along the Upper Reach. Two of the vegetation plots met the planting baseline of 436 planted stems/acre. There are a couple of reasons that this may have occurred. First, the survey was completed in September which was 6 months after the site was planted and some stems may have been browsed or died back the initial year. Secondly, the Lower Reach was flooded and although the waters had receded during the survey, some plants may have been knocked over or under sediment/debris following the bankfull event. Currently, 12 plots are meeting the interim 3-year vegetation success criteria of 320 stems/acre. Baseline monitoring data is provided in the Appendix C data tables.

4.7 Photo Documentation

Photos were taken at 52 photo stations on September 19, 2012. The locations of the stations are shown in Figure 3 in Appendix A and photos are located in Appendix B. Baseline vegetation station photos were taken on September 17 and 18, 2012 during the baseline vegetation monitoring. Vegetation station photos for the baseline monitoring year are provided in Appendix C.

4.8 Hydrology

No groundwater monitoring gauges were installed onsite during the baseline monitoring; however, 35 wells are to be placed within the proposed wetland areas to document hydrology for the remaining 5 years of monitoring (Figure 3). A crest gauge was installed and evidence of a bankfull event was noted along the site in wrack lines, vegetation lying over, and ponded water on the floodplain. During the baseline monitoring a bankfull event was documented with photos on September 18, 2012.

5.0 REFERENCES CITED

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Appendix A

General Tables and Figures

Table 1a. Project Components Fletcher-Meritor Site (UT to Cane Creek) Stream and Wetland Restoration/Project No. 138									
Project Component or Reach ID	Existing Feet/Acres	Restoration Level	Approach	Footage or Acreage	Stationing	Mitigation Ratio	Mitigation Units	BMP Elements	Comment
Main Steam Upper Reach	1520 lf	R	P2	1838 lf	10+00-28+38	1:1	1838		Fully restores pattern, dimension and profile by excavating a new channel with an adjoining floodplain bench that grades to the existing ground elevation in order to partial restore flood prone conditions.
Main Steam Lower Reach	1320 lf	R	P2	1779 lf	10+00-27+79	1:1	1779		Fully restores pattern, dimension and profile by excavating a new channel with an adjoining floodplain bench that grades to the existing ground elevation in order to partial restore flood prone conditions.
Tributary	550 lf	R	P2	648 lf	10+00-16+48	1:1	648		Fully restores pattern, dimension and profile by excavating a new channel with an adjoining floodplain bench that grades to the existing ground elevation in order to partial restore flood prone conditions.
Wetland A	0 acres (TBD)	R		2.92 acres		1:1	2.92		Restores topography, hydrology, and habitats of a natural wetland system by excavating new floodplains and filling agricultural ditches to promote an increase in ground water elevation.
Wetland B	0 acres (TBD)	R		1.43 acres		1:1	1.43		Restores topography, hydrology, and habitats of a natural wetland system by excavating new floodplains and filling agricultural ditches to promote an increase in ground water elevation.
Wetland C	0 acres (TBD)	R		1.34 acres		1:1	1.34		Restores topography, hydrology, and habitats of a natural wetland system by excavating new floodplains and filling agricultural ditches to promote an increase in ground water elevation.
Wetland D	0 acres (TBD)	R		0.97 acres		1:1	0.97		Restores topography, hydrology, and habitats of a natural wetland system by excavating new floodplains and filling agricultural ditches to promote an increase in ground water elevation.

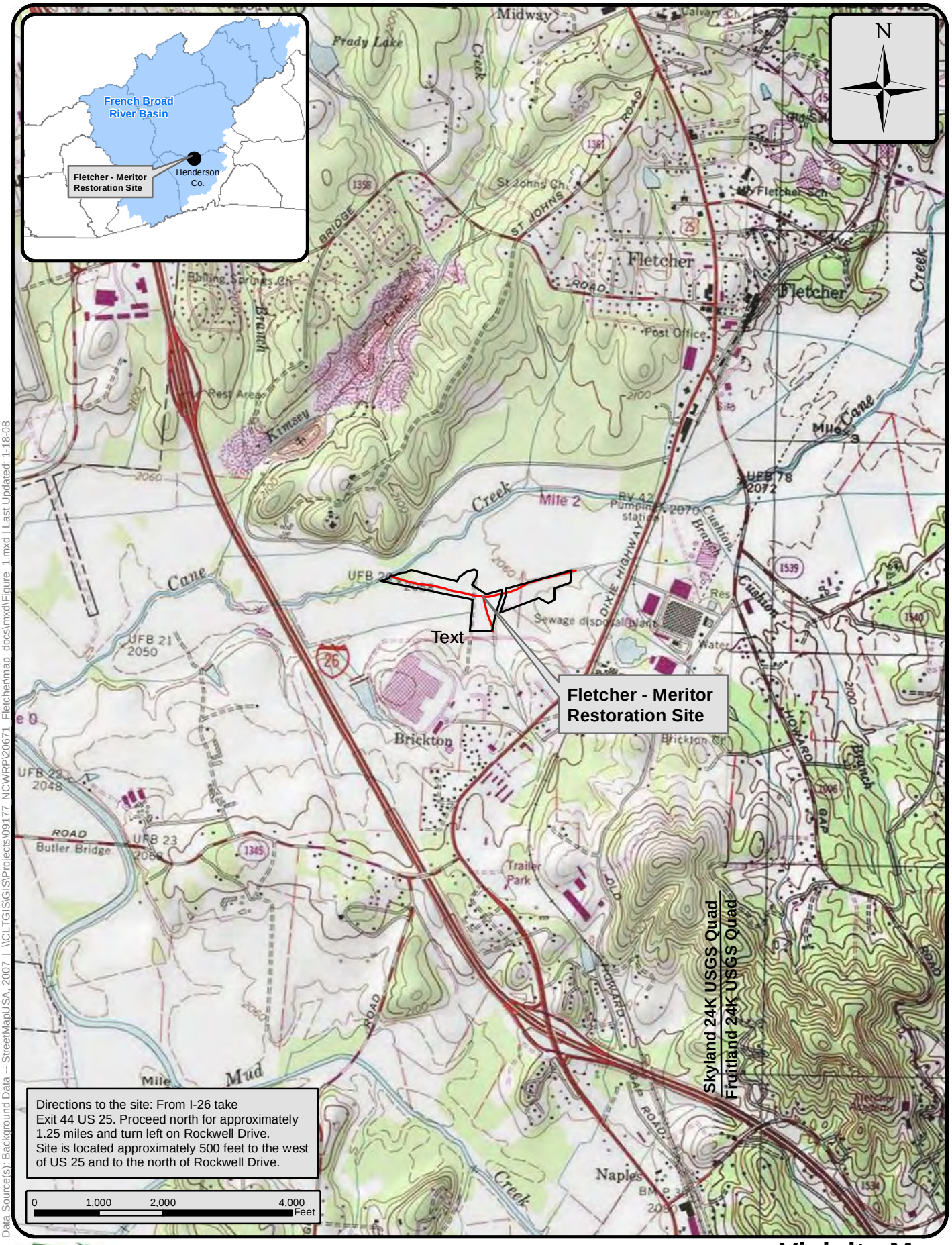
Table 1b. Component Summations
Fletcher-Meritor Site(UT to Cane Creek) Stream and Wetland Restoration/Project No. 138

Restoration Level	Stream (lf)	Stream Mitigation Units (lf)	Riparian Wetland (Ac)		Planted Area (Ac)	Potential Buffer Area (sf)	Upland (Ac)	Total Conservation Area (Ac)	BMP
			Riverine	Non-Riverine					
Main Steam Upper Reach	1838	1838	0.0	0.0					
Main Steam Lower Reach	1779	1779	0.0	0.0					
Tributary	648	648	0.0	0.0					
Wetland A	0	0	2.92						
Wetland B	0	0	1.43						
Wetland C	0	0	1.34						
Wetland D	0	0	0.97						
(Feet/Acres)	4,265	4,265	6.7		18.59			20.3	

Table 2. Project Activity and Reporting History Fletcher-Meritor Site (UT to Cane Creek) Stream and Wetland Restoration/Project No. 138		
Elapsed Time Since Grading Complete: 0 yrs 3 months		
Elapsed Time Since Planting Complete: 0 yrs 3 Months		
Number of Reporting Years: 0		
Activity or Deliverable	Data Collection Complete	Completion or Delivery
Restoration Plan	December 2007	February 15, 2008
Final Design – Construction Plans	December 2007	May 2011
Construction/Grading	NA	May 2012
Temporary Seeding	NA	Dec. 2011-April 2012
Permanent Seeding	NA	April 2012
Planting (containerized, bare root)	NA	April 2012
Final Inspection	NA	June 2012
Mitigation Plan / As-built (Year 0 Monitoring – baseline)	September 2012	May 2013
Year 1 Monitoring		
Year 2 Monitoring		
Year 3 Monitoring		
Year 4 Monitoring		
Year 5 Monitoring		

Table 3. Project Contacts Table Fletcher-Meritor Site (UT to Cane Creek) Stream and Wetland Restoration/Project No. 138	
Designer	HDR Engineering Inc. of the Carolinas 3733 National Drive, Suite 207, Raleigh, NC 27612
Primary project design POC	Jonathan Henderson, PE (919) 785-1118
Construction Contractor	Buchanan and Sons, Inc. P.O. Box 123, Whittier, NC 28789
Construction contractor POC	Chris Buchanan, (828) 497-9720
Survey Contractor	Terminus Land Surveying, PLLC 28 Bessie Drive, Fletcher, NC 28724
Survey contractor POC	Christopher J. Gagne, (828) 551-8928
Planting Contractor	HARP, Inc. 301 McCullough Drive, 4th Floor, Charlotte, NC 28262
Planting contractor POC	Alan Peoples, (704) 841-2841
Seeding Contractor	Buchanan and Sons, Inc. P.O. Box 123, Whittier, NC 28789
Contractor point of contact	Chris Buchanan, (828) 497-9720
Seed Mix Sources	Protech Environmental, Charlotte, NC Phone: (704) 676-9788
Nursery Stock Suppliers	Cure Nursery, Pittsboro, NC - (919) 542-6186 Foggy Mountain Nursery LLC, Creston, NC - (336) 384-5323 Supertree Nursery, Blenheim, SC - (800) 222-1290 Habitat and Restoration Plants, Lexington, NC - (336) 362-6776 NC Division of Forest Resources, Greensboro, NC - (919) 731-7988 Little River Nursery, McMinnville, TN - (931) 668-8000 Virginia Department of Forestry, Crimora, VA - (540) 363-5732
Monitoring Performers - Baseline	HDR Engineering Inc. of the Carolinas 3733 National Drive, Suite 207, Raleigh, NC 27612 Vickie Miller, AICP, PWS (919) 232-6637
Stream Monitoring POC (Baseline)	Wyatt Yelverton, PE (919) 232-6623
Vegetation Monitoring POC (Baseline)	Vickie Miller, AICP, PWS (919) 232-6637
Wetland Monitoring POC (Baseline)	NA
Stream Monitoring POC (MY 1)	
Vegetation Monitoring POC (MY 1)	
Wetland Monitoring POC (MY 1)	
Stream Monitoring POC (MY 2)	
Vegetation Monitoring POC (MY 2)	
Wetland Monitoring POC (MY 2)	
Stream Monitoring POC (MY 3)	
Vegetation Monitoring POC (MY 3)	
Wetland Monitoring POC (MY 3)	
Stream Monitoring POC (MY 4)	
Vegetation Monitoring POC (MY 4)	
Wetland Monitoring POC (MY 4)	
Stream Monitoring POC (MY 5)	
Vegetation Monitoring POC (MY 5)	
Wetland Monitoring POC (MY 5)	

Table 4. Project Attribute Table Fletcher-Meritor Site (UT to Cane Creek) Stream and Wetland Restoration/Project No. 138							
Project County	Henderson						
Physiographic Region	Mountains						
Ecoregion	Blue Ridge (Broad Basins)						
Project River Basin	French Broad River Basin						
USGS HUC for Project (8 digit)	6010105						
NCDWQ Sub-basin for Project	04-03-02						
Within extent of EEP Watershed Plan?	No						
WRC Hab Class (Warm, Cool, Cold)	Warm						
% of project easement fenced or demarcated	100% marked with EEP easement signage						
Beaver activity observed during design phase?	No						
Restoration Component Attribute Table							
	Main Steam Upper Reach	Main Steam Lower Reach	Tributary	Wetland A	Wetland B	Wetland C	Wetland D
Drainage area (ac)	480	704	205	NA	NA	NA	NA
Stream order	2nd		1st	NA	NA	NA	NA
Restored length (feet or acreage)	1838	975	648	2.92	1.43	1.34	0.97
Perennial or Intermittent				NA	NA	NA	NA
Watershed type (Rural, Urban, Developing etc.)	Devel.						
Watershed LULC Distribution (e.g.)							
Watershed impervious cover (%) (Commercial/Institutional Buildings/Roads)	38						
Forested	20						
Low Density Residential / Open Fields/ Lawns	28						
Medium-Density Residential	14						
NCDWQ AU/Index number	-						
NCDWQ classification	C			NA	NA	NA	NA
303d listed?	No			NA	NA	NA	NA
Upstream of a 303d listed segment?	Yes			NA	NA	NA	NA
Reasons for 303d listing or stressor	Biological Integrity (Benthos)			NA	NA	NA	NA
Total acreage of easement	20.3						
Total vegetated acreage within the easement	18.59						
Total planted acreage as part of the restoration	18.59						
Rosgen classification of pre-existing	Impaired Ditch	Impaired Ditch	Impaired Ditch	NA	NA	NA	NA
Rosgen classification of As-built	C/E4	C/E4	C/E4	NA	NA	NA	NA
Valley type	VIII	VIII	VIII	NA	NA	NA	NA
Valley slope	0.31%		0.15%	NA	NA	NA	NA
Valley side slope range (e.g. 2-3.%)	-	-		NA	NA	NA	NA
Valley toe slope range (e.g. 2-3.%)	-	-		NA	NA	NA	NA
Cowardin classification	NA			Palustrine	Palustrine	Palustrine	Palustrine
Trout waters designation	No			NA	NA	NA	NA
Species of concern, endangered etc.? (Y/N)	No						
Dominant soil series and characteristics							
Series	Comus	Codorus	Kinkora	Codorus / Kinkora	Kinkora	Kinkora	Comus / Kinkora
Depth	U	U	U	U	U	U	U
Clay%	U	U	U	U	U	U	U
K	U	U	U	U	U	U	U
T	U	U	U	U	U	U	U



Vicinity Map

Figure 1

Fletcher-Meritor Site (UT to Cane Creek) Baseline Monitoring I Henderson County, NC
NC Ecosystem Enhancement Program | Project No. 138

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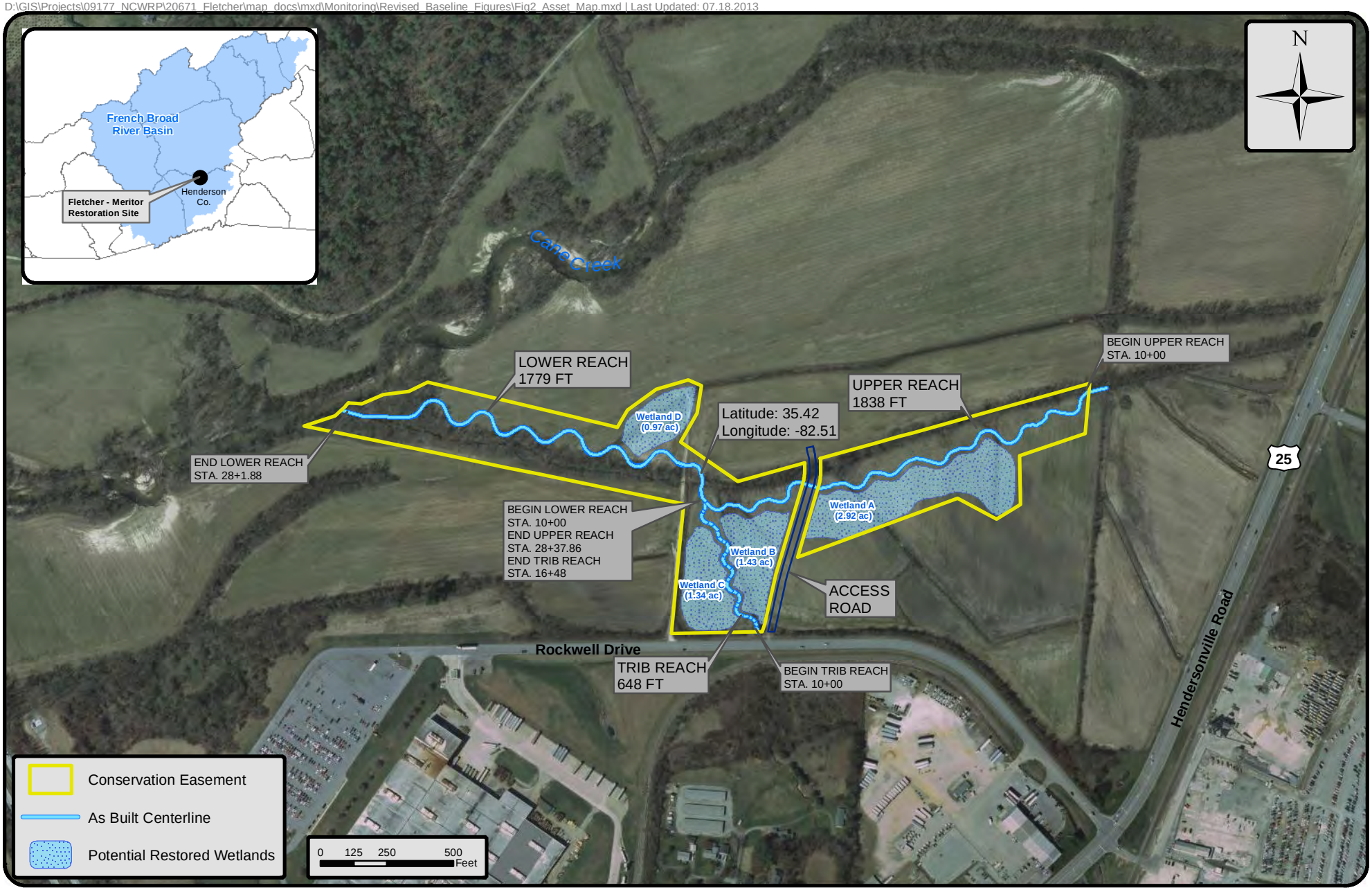
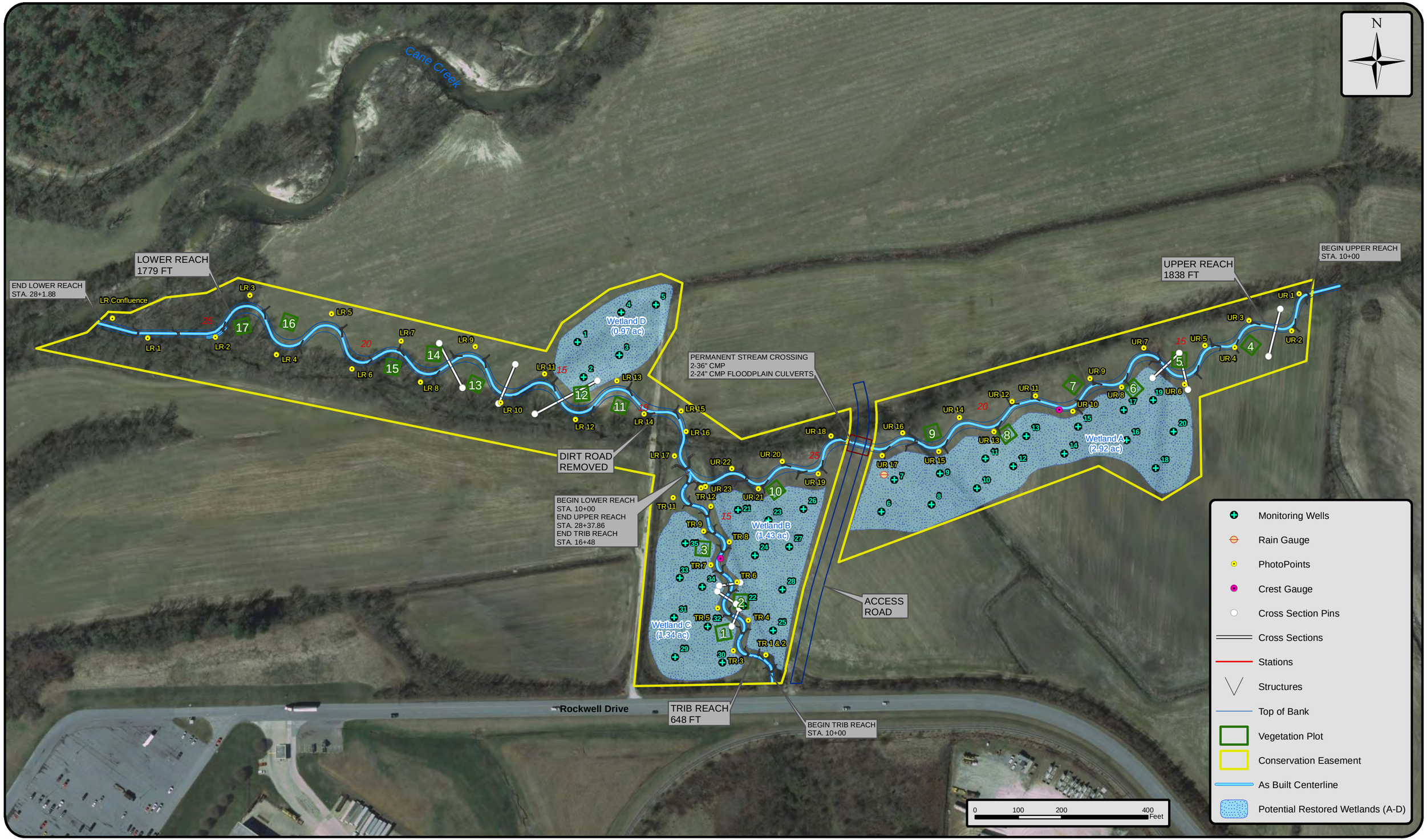


Asset Map

Figure 2

Fletcher-Meritor Site (UT to Cane Creek) Baseline Monitoring I Henderson County, NC
NC Ecosystem Enhancement Program | Project No. 138



Ecosystem Enhancement Program

HDR ONE COMPANY | Many Solutions

Current Conditions Plan View

Figure 3a

Fletcher-Meritor Site (UT to Cane Creek) Baseline Monitoring I Henderson County, NC
NC Ecosystem Enhancement Program | Project No. 138

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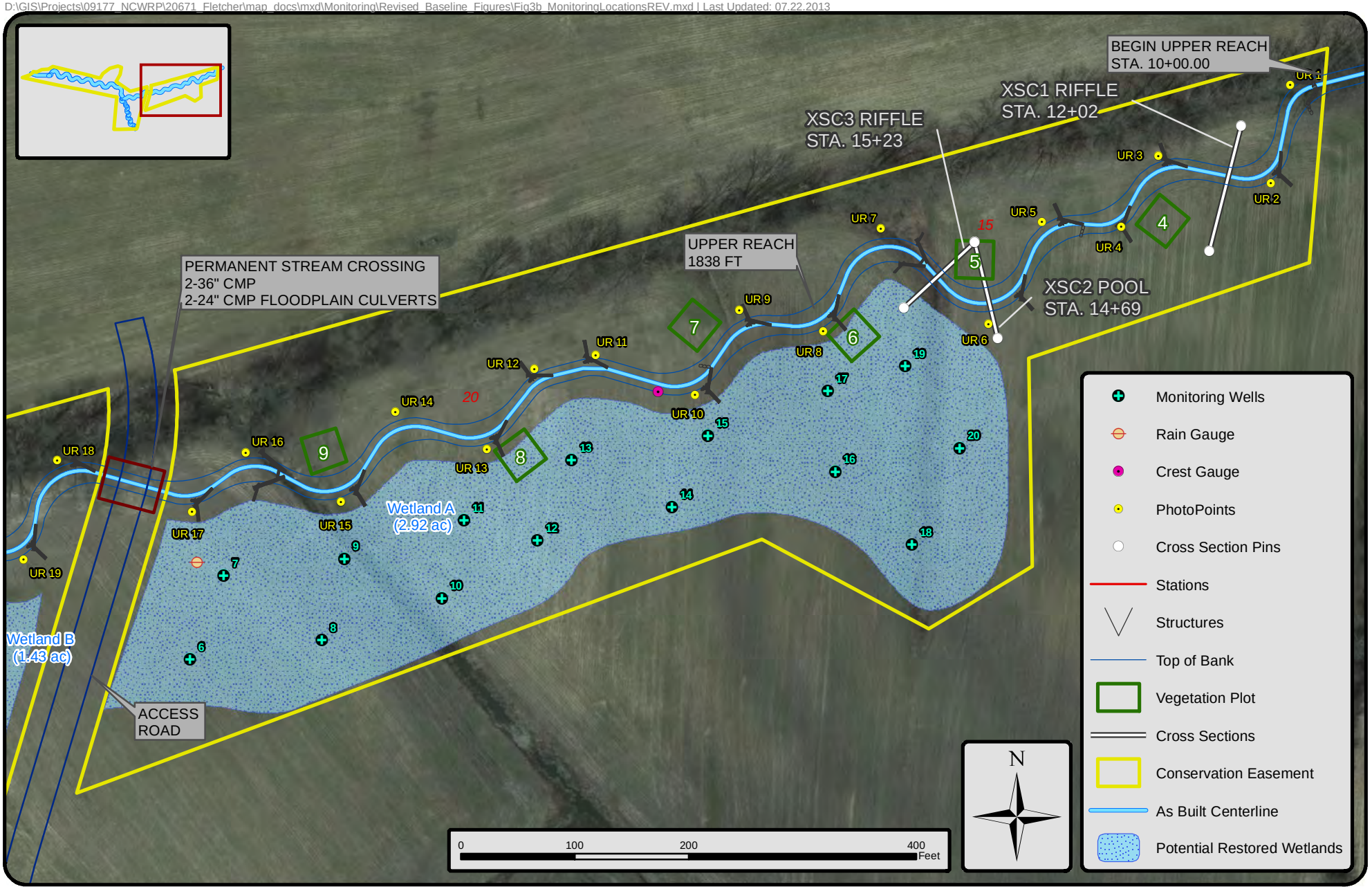
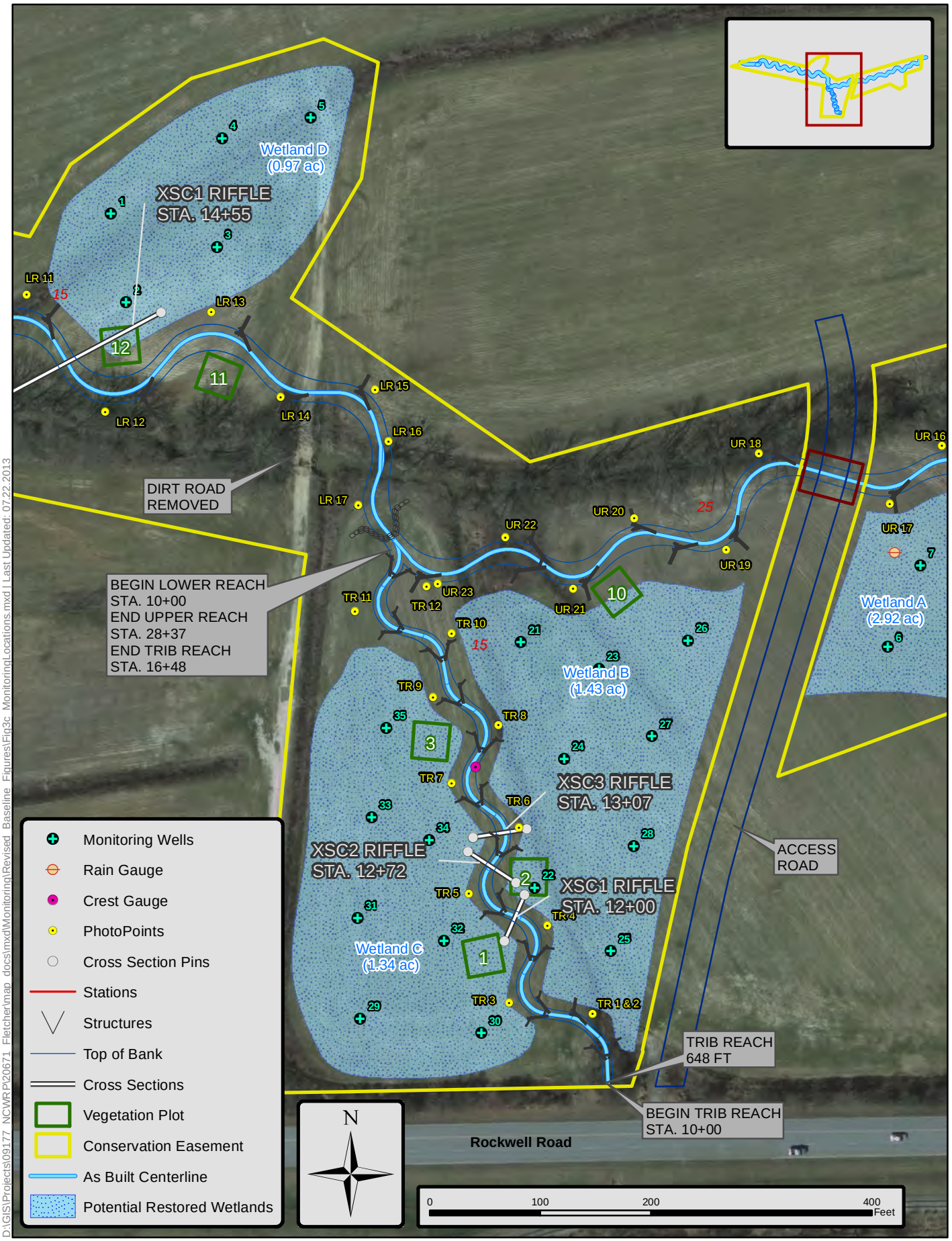


Current Conditions Plan View

Figure 3b

Fletcher-Meritor Site (UT to Cane Creek) Baseline Monitoring I Henderson County, NC
NC Ecosystem Enhancement Program | Project No. 138



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Current Conditions Plan View

Figure 3c

Fletcher-Meritor Site (UT to Cane Creek) Baseline Monitoring I Henderson County, NC
NC Ecosystem Enhancement Program | Project No. 138

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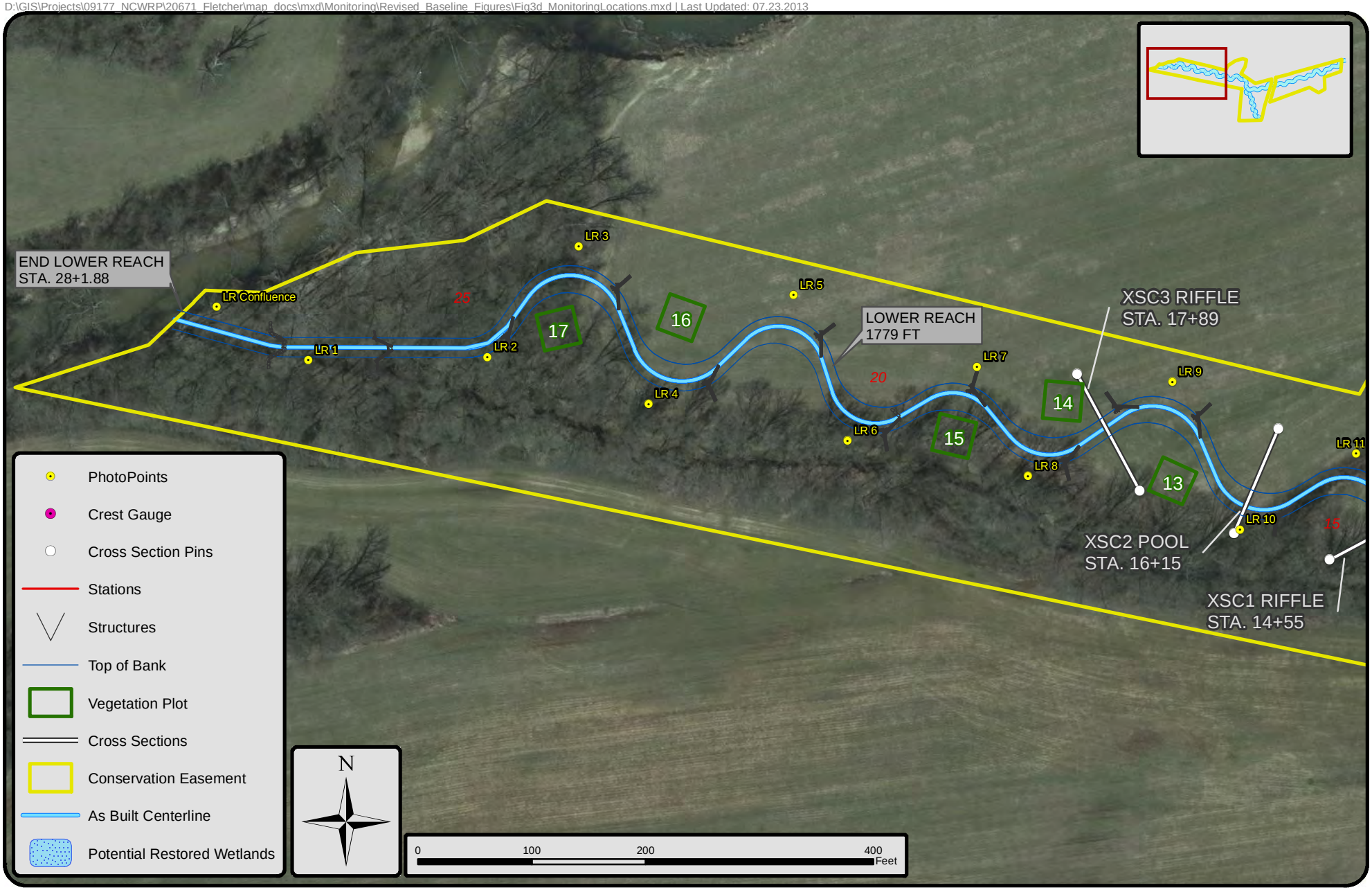
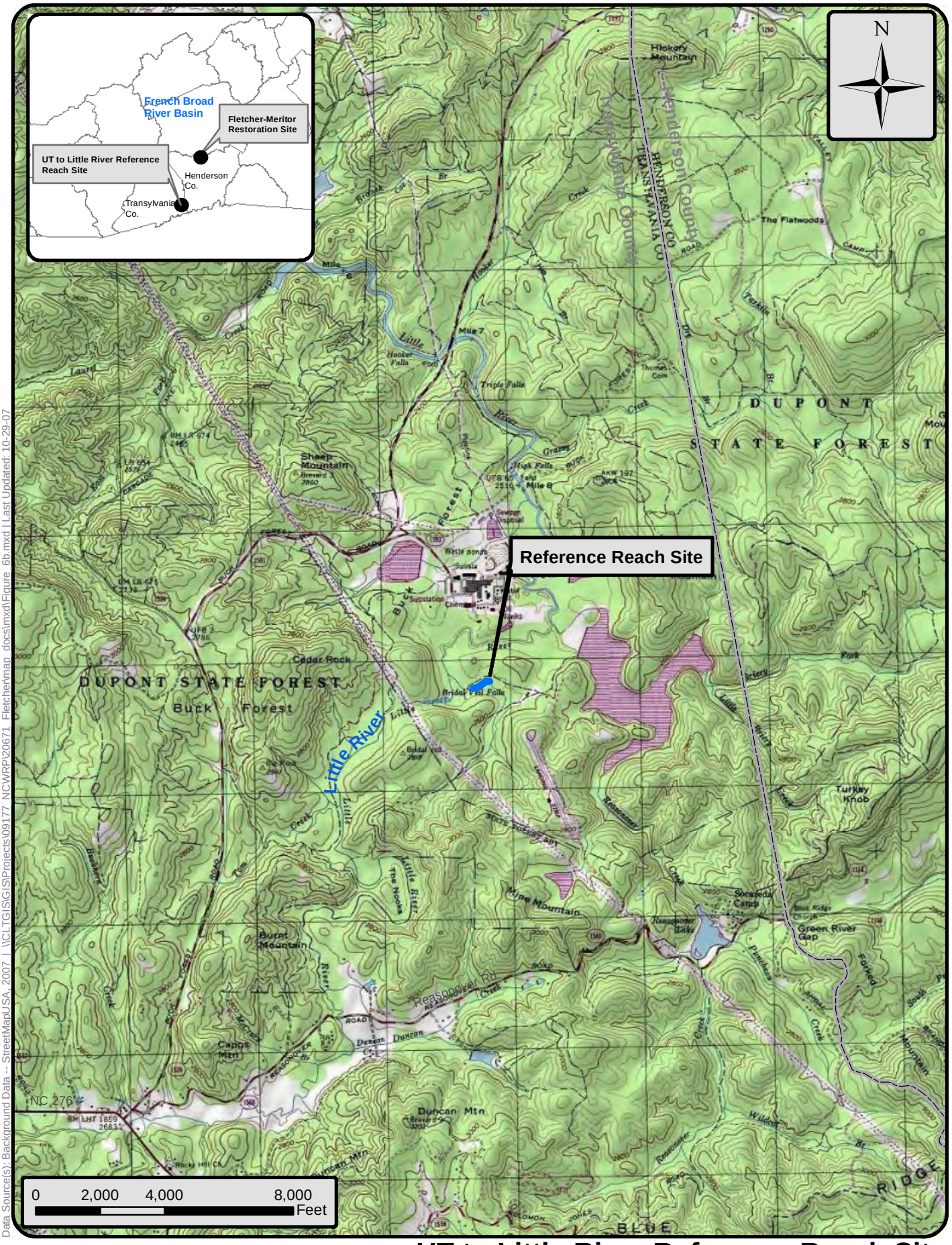


Current Conditions Plan View

Figure 3d

Fletcher-Meritor Site (UT to Cane Creek) Baseline Monitoring I Henderson County, NC
NC Ecosystem Enhancement Program | Project No. 138

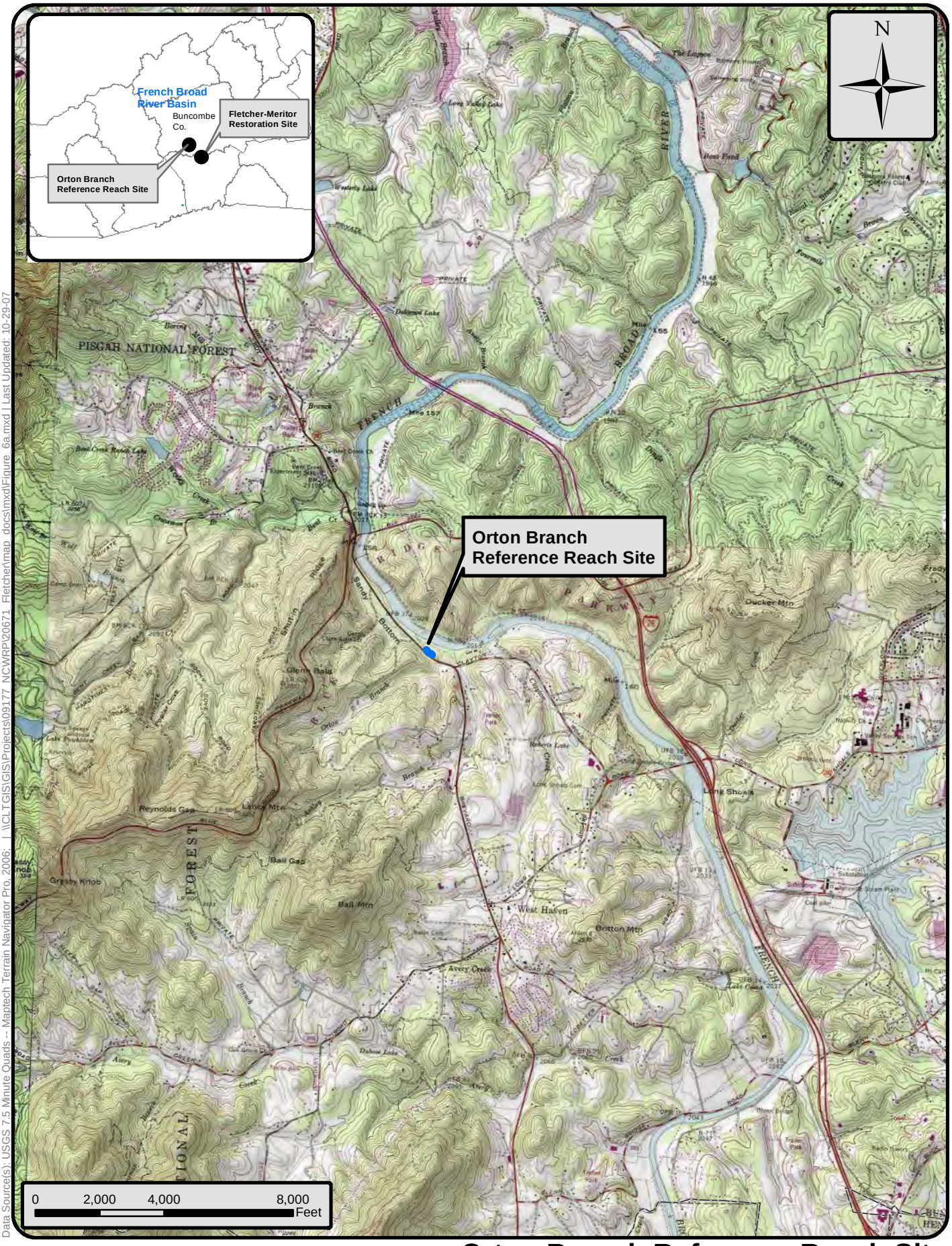


Data Source(s): Background Data -- StreetMap USA, 2007 | \CLT\GIS\GIS\Projects\09177_NCWRP\20671_Fletcher\map_docs\mxd\Figure_6b.mxd | Last Updated: 10-29-07

UT to Little River Reference Reach Site

Figure 4a

Fletcher-Meritor Site (UT to Cane Creek) Baseline Monitoring I Henderson County, NC
NC Ecosystem Enhancement Program | Project No. 138



Data Source(s): USGS 7.5 Minute Quads -- Maptech Terrain Navigator Pro, 2006 | \\CLT\GIS\GIS\Projects\09177 NCWRP\20671 Fletcher\map docs\mxd\Figure 6a.mxd | Last Updated: 10-29-07

Orton Branch Reference Reach Site

Figure 4b

Fletcher-Meritor Site (UT to Cane Creek) Baseline Monitoring I Henderson County, NC
NC Ecosystem Enhancement Program | Project No. 138

Appendix B

Morphological Summary Data and Plots

Table 5a. Baseline Stream Data Summary
Fletcher-Meritor (UT to Cane Creek) Stream and Wetland Restoration/Proj. No. 138 - Upper Reach (1838 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)							11.00				9.40			13.50				15.00		14.50	14.80		15.10		2
Floodprone Width (ft)							11.00				125.00			200.00				45.00		53.00			>86.0		2
Bankfull Mean Depth (ft)							2.80				1.50			1.60				1.50		1.26	1.37		1.47		2
[1]Bankfull Max Depth (ft)							4.00				2.00			2.30				1.88		1.80	2.00		2.20		2
Bankfull Cross Sectional Area (ft^2)							30.40				15.20			20.60				21.13		19.10	20.20		21.30		2
Width/Depth Ratio							3.90				5.90			9.00				10.00		9.87	10.91		11.94		2
Entrenchment Ratio							1.00				9.30			21.30				3.00		3.50			>6.00		2
[1]Bank Height Ratio											1.10			1.20				1.00		1.00	1.00		1.00		2
Profile																									
Riffle Length (ft)											2.00			15.00						11.48	25.61	23.29	45.54	14.93	6
Riffle Slope (ft/ft)							0.0348				0.0110			0.0150				0.0082		0.0025	0.0075	0.0040	0.0203	0.7100	6
Pool Length (ft)											2.00			28.00						14.20	28.75	21.87	63.10	18.63	6
Pool Max depth (ft)							5.83				2.90			3.20				2.93		2.63	2.93	2.83	3.56	0.36	6
Pool Spacing (ft)											7.00			42.00			15.00		67.00	61.00	70.58	68.71	89.47	21.50	5
Pattern																									
Channel Beltwidth (ft)					Straightened Channel						19.00			51.00			30.00		81.00	33.00	48.40	44.80	75.00	11.08	22
Radius of Curvature (ft)											9.00			54.00			20.00		60.00	30.00	37.70	40.00	40.00	4.30	22
Rc:Bankfull width (ft/ft)											0.70			4.00			2.00		3.00	2.03	2.55	2.70	2.70	0.29	22
Meander Wavelength (ft)											35.00			182.00			56.00		202.00	101.00	129.70	130.00	180.00	16.68	21
Meander Width Ratio											0.00			5.40			2.00		5.40	2.22	3.27	3.03	5.03	0.75	22
Transport parameters																									
Reach Shear Stress (competency) lb/ft^2																									
Max part size (mm) mobilized at bankfull																									
Stream Power (transport capacity) W/m^2																									
Additional Reach Parameters																									
Rosgen Classification					Impaired Ditch (G4)						C/E4						C/E4			C/E4					
Bankfull Velocity (fps)							3.00										3.08								
Bankfull Discharge (cfs)							90.00																		
Valley length (ft)							1,520																		
Channel Thalweg length (ft)							1,520										1,838			1,838					
Sinuosity (ft)							1.00				1.17 & 1.50						1.18			1.18					
Water Surface Slope (Channel) (ft/ft)							0.0031				0.0021 & 0.0046						0.0021			0.0025					
BF slope (ft/ft)																	0.0021			0.0027					
[3]Bankfull Floodplain Area (acres)																									
[4]% of Reach with Eroding Banks																									
Channel Stability or Habitat Metric																									
Biological or Other																									

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing survey data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 5b. Baseline Stream Data Summary
Fletcher-Meritor (UT to Cane Creek) Stream and Wetland Restoration/Proj. No. 138 - Lower Reach (1779 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)							20.20				9.40			13.50				17.00		17.20	18.49		19.77		2
Floodprone Width (ft)							20.20				125.00			200.00				51.00		97.90	117.63		137.36		2
Bankfull Mean Depth (ft)							2.70				1.50			1.60				1.70		1.36	1.56		1.75		2
[1]Bankfull Max Depth (ft)							6.00				2.00			2.30				2.13		2.20	2.34		2.47		2
Bankfull Cross Sectional Area (ft^2)							55.10				15.20			20.60				27.13		23.40	28.95		34.50		2
Width/Depth Ratio							7.50				5.90			9.00				10.00		11.32	11.99		12.65		2
Entrenchment Ratio							1.00				9.30			21.30				3.00		5.69	6.32		6.95		2
[1]Bank Height Ratio											1.10			1.20				1.00		1.00	1.00		1.00		2
Profile																									
Riffle Length (ft)											2.00			15.00						7.73	23.60	24.49	43.50	11.37	10
Riffle Slope (ft/ft)							0.0270				0.0110			0.0150				0.0080		0.0035	0.0094	0.0094	0.0172	0.4000	10
Pool Length (ft)											2.00			28.00						22.25	37.41	38.04	56.23	11.18	10
Pool Max depth (ft)							6.10				2.90			3.20				3.32		3.13	3.44	3.42	3.85	0.22	10
Pool Spacing (ft)											7.00			42.00			17.00		76.00	44.30	74.46	82.61	90.34	16.55	7
Pattern																									
Channel Beltwidth (ft)					Straightened Channel						19.00			51.00			34.00		92.00	36.00	65.30	69.00	83.00	13.68	16
Radius of Curvature (ft)											9.00			54.00			34.00		51.00	35.00	42.20	45.00	45.00	3.64	16
Rc:Bankfull width (ft/ft)											0.70			4.00			2.00		3.00	1.89	2.28	2.43	2.43	0.20	16
Meander Wavelength (ft)											35.00			182.00			63.00		229.00	128.00	167.70	172.00	193.00	18.30	12
Meander Width Ratio											0.00			5.40			3.70		13.50	1.95	3.53	3.73	4.49	0.74	16
Transport parameters																									
Reach Shear Stress (competency) lb/ft^2																									
Max part size (mm) mobilized at bankfull																									
Stream Power (transport capacity) W/m^2																									
Additional Reach Parameters																									
Rosgen Classification					Impaired Ditch (G4)						C/E4						C/E4			C/E4					
Bankfull Velocity (fps)							4.20										3.32								
Bankfull Discharge (cfs)							235.00																		
Valley length (ft)							1,320																		
Channel Thalweg length (ft)							1,320										1,802				1,779				
Sinuosity (ft)							1.00					1.17 & 1.50					1.24				1.23				
Water Surface Slope (Channel) (ft/ft)							0.0031					0.0021 & 0.0046					0.0021				0.0027				
BF slope (ft/ft)																	0.0021				0.0024				
[3]Bankfull Floodplain Area (acres)																									
[4]% of Reach with Eroding Banks																									
Channel Stability or Habitat Metric																									
Biological or Other																									

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing survey data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 5c. Baseline Stream Data Summary
Fletcher-Meritor (UT to Cane Creek) Stream and Wetland Restoration/Proj. No. 138 - Tributary (648 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)							16.20				9.40			13.50				9.00		8.33	8.79		9.24		2
Floodprone Width (ft)							16.20				125.00			200.00				27.00		22.32	23.62		24.91		2
Bankfull Mean Depth (ft)							2.80				1.50			1.60				0.90		0.82	0.83		0.83		2
[1]Bankfull Max Depth (ft)							2.10				2.00			2.30				1.13		1.19	1.22		1.25		2
Bankfull Cross Sectional Area (ft^2)							45.40				15.20			20.60				7.61		6.80	7.22		7.63		2
Width/Depth Ratio							5.80				5.90			9.00				10.00		10.21	10.70		11.19		2
Entrenchment Ratio							1.00				9.30			21.30				3.00		2.68	2.69		2.70		2
[1]Bank Height Ratio											1.10			1.20				1.00		1.00	1.00		1.00		2
Profile																									
Riffle Length (ft)											2.00			15.00						13.84	18.32	18.80	21.90	2.89	9
Riffle Slope (ft/ft)							0.0234				0.0110			0.0150				0.0150		0.0087	0.0142	0.0144	0.0220	0.5800	9
Pool Length (ft)											2.00			28.00						13.03	22.26	17.58	36.76	9.30	10
Pool Max depth (ft)							5.00				2.90			3.20				1.76		1.45	1.89	1.93	2.40	0.32	10
Pool Spacing (ft)											7.00			42.00			9.00		40.00	36.53	52.91	56.00	60.11	9.09	9
Pattern																									
Channel Beltwidth (ft)					Straightened Channel						19.00			51.00			18.00		49.00	26.00	39.20	38.00	55.00	8.33	10
Radius of Curvature (ft)											9.00			54.00			18.00		27.00	25.00	25.00	25.00	25.00	0.00	12
Rc:Bankfull width (ft/ft)											0.70			4.00			2.00		3.00	2.84	2.84	2.84	2.84	0.00	12
Meander Wavelength (ft)											35.00			182.00			34.00		121.00	77.00	92.90	96.00	102.00	8.63	10
Meander Width Ratio											0.00			5.40			3.70		13.50	2.96	4.46	4.32	6.26	0.95	10
Transport parameters																									
Reach Shear Stress (competency) lb/ft^2																									
Max part size (mm) mobilized at bankfull																									
Stream Power (transport capacity) W/m^2																									
Additional Reach Parameters																									
Rosgen Classification					Impaired Ditch (G4)						C/E4						C/E4			C/E4					
Bankfull Velocity (fps)							2.20										3.29								
Bankfull Discharge (cfs)							100.00																		
Valley length (ft)							550																		
Channel Thalweg length (ft)							550										648			648					
Sinuosity (ft)							1.00				1.17 & 1.50						1.22			1.22					
Water Surface Slope (Channel) (ft/ft)							0.015				0.0021 & 0.0046						0.009			0.0114					
BF slope (ft/ft)																	0.009			0.0118					
[3]Bankfull Floodplain Area (acres)																									
[4]% of Reach with Eroding Banks																									
Channel Stability or Habitat Metric																									
Biological or Other																									

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing survey data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 6. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)

Fletcher-Meritor (UT to Cane Creek) Stream and Wetland Restoration/Proj. No. 138 - Upper Reach (1838 ft), Lower Reach (1779 ft), Tributary (648 ft)

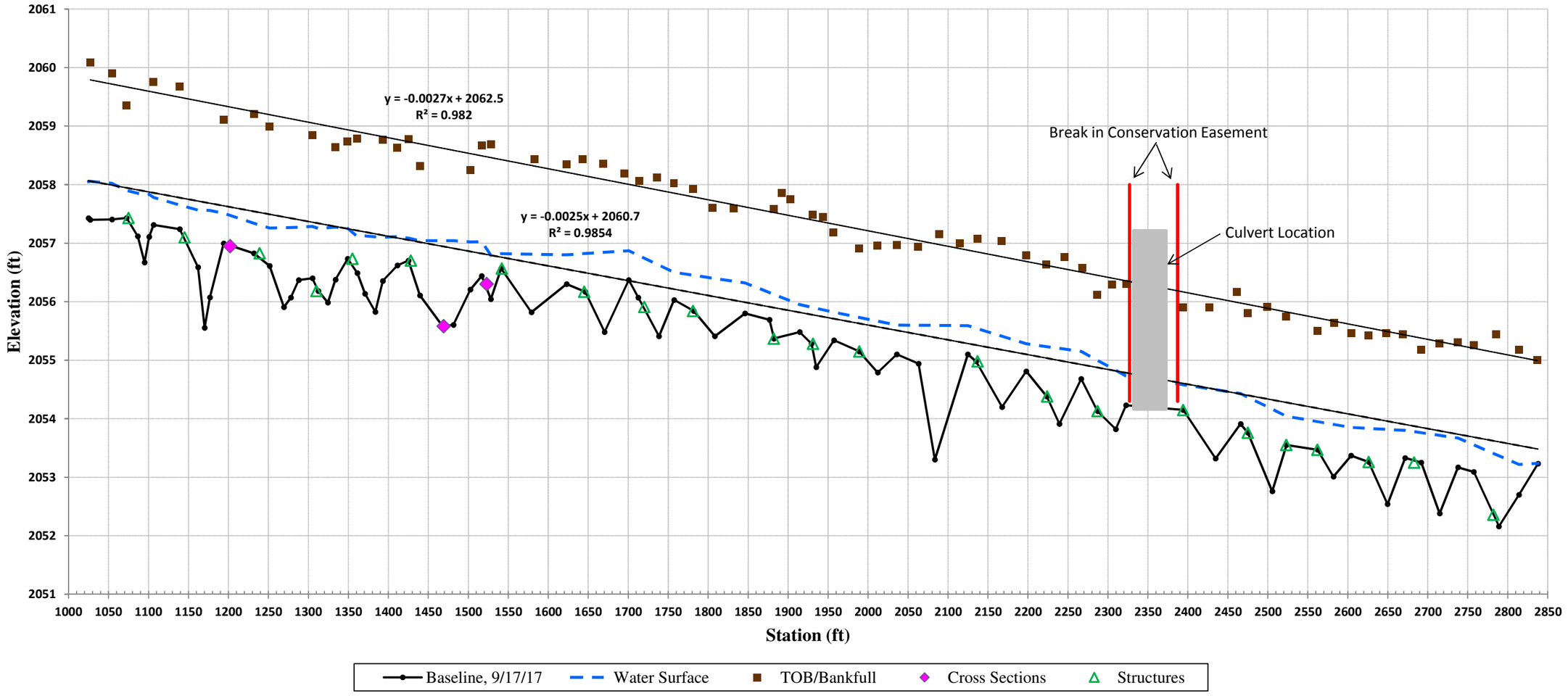
	Cross Section 1 (Upper, Riffle)							Cross Section 2 (Upper, Pool)							Cross Section 3 (Upper, Riffle)							Cross Section 4 (Lower, Riffle)							Cross Section 5 (Lower, Pool)						
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used	2058.90							2058.61							2058.74							2053.74							2053.32						
Bankfull Width (ft)	15.10							21.90							14.50							19.77							26.16						
Floodprone Width (ft)	53.00							>86.00							>86.00							137.36							83.70						
Bankfull Mean Depth (ft)	1.26							1.25							1.47							1.75							1.45						
Bankfull Max Depth (ft)	1.80							3.10							2.20							2.47							3.31						
Bankfull Cross Sectional Area (ft^2)	19.10							27.40							21.30							34.50							37.88						
Bankfull Width/Depth Ratio	11.94							17.50							9.87							11.32							18.07						
Bankfull Entrenchment Ratio	3.50							>4.00							>6.00							6.95							3.20						
Bankfull Bank Height Ratio	1.00							1.00							1.00							1.00							1.00						
Based on current/developing bankfull feature[2]																																				
Record elevation (datum) used																																				
Bankfull Width (ft)																																				
Floodprone Width (ft)																																				
Bankfull Mean Depth (ft)																																				
Bankfull Max Depth (ft)																																				
Bankfull Cross Sectional Area (ft^2)																																				
Bankfull Width/Depth Ratio																																				
Bankfull Entrenchment Ratio																																				
Bankfull Bank Height Ratio																																				
Cross Sectional Area between end pins (ft^2)																																				
d50 (mm)																																				

	Cross Section 6 (Lower, Riffle)							Cross Section 7 (Tributary, Riffle)							Cross Section 8 (Tributary, Riffle)							Cross Section 9 (Tributary, Pool)													
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used	2053.03							2059.00							2058.45							2057.55													
Bankfull Width (ft)	17.20							9.24							8.33							12.81													
Floodprone Width (ft)	97.90							24.91							22.32							25.89													
Bankfull Mean Depth (ft)	1.36							0.83							0.82							0.93													
Bankfull Max Depth (ft)	2.20							1.25							1.19							2.04													
Bankfull Cross Sectional Area (ft^2)	23.40							7.63							6.80							11.96													
Bankfull Width/Depth Ratio	12.65							11.19							10.21							13.71													
Bankfull Entrenchment Ratio	5.69							2.70							2.68							2.02													
Bankfull Bank Height Ratio	1.00							1.00							1.00							1.00													
Based on current/developing bankfull feature[2]																																				
Record elevation (datum) used																																				
Bankfull Width (ft)																																				
Floodprone Width (ft)																																				
Bankfull Mean Depth (ft)																																				
Bankfull Max Depth (ft)																																				
Bankfull Cross Sectional Area (ft^2)																																				
Bankfull Width/Depth Ratio																																				
Bankfull Entrenchment Ratio																																				
Bankfull Bank Height Ratio																																				
Cross Sectional Area between end pins (ft^2)																																				
d50 (mm)																																				

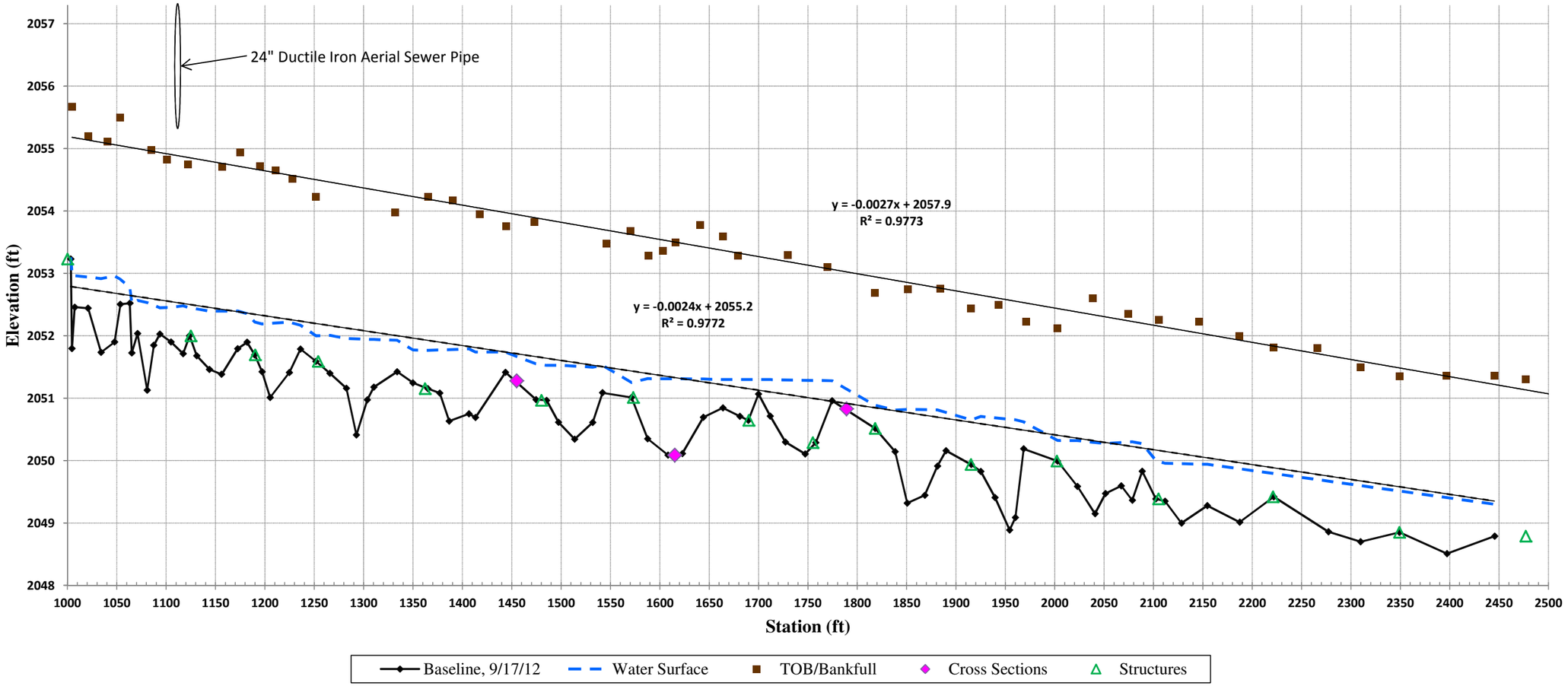
1 = Widths and depths for monitoring resurvey will be based on the baseline bankfull datum regardless of dimensional/depositional development. Input the elevation used as the datum, which should be consistent and based on the baseline datum established. If the performer has inherited the project and cannot acquire the datum used for prior years this must be discussed with EEP. If this cannot be resolved in time for a given years report submission a footnote in this should be included that states: "It is uncertain if the monitoring datum has been consistent over the monitoring history, which may influence calculated values. Additional data from a prior performer is being acquired to provide confirmation. Values will be recalculated in a future submission based on a consistent datum if determined to be necessary."

2 = Based on the elevation of any dominant depositional feature that develops and is observed at the time of survey. If the baseline datum remains the only significant depositional feature then these two sets of dimensional parameters will be equal, however, if another depositional feature of significance develops above or below the baseline bankfull datum then this should be tracked and quantified in these cells.

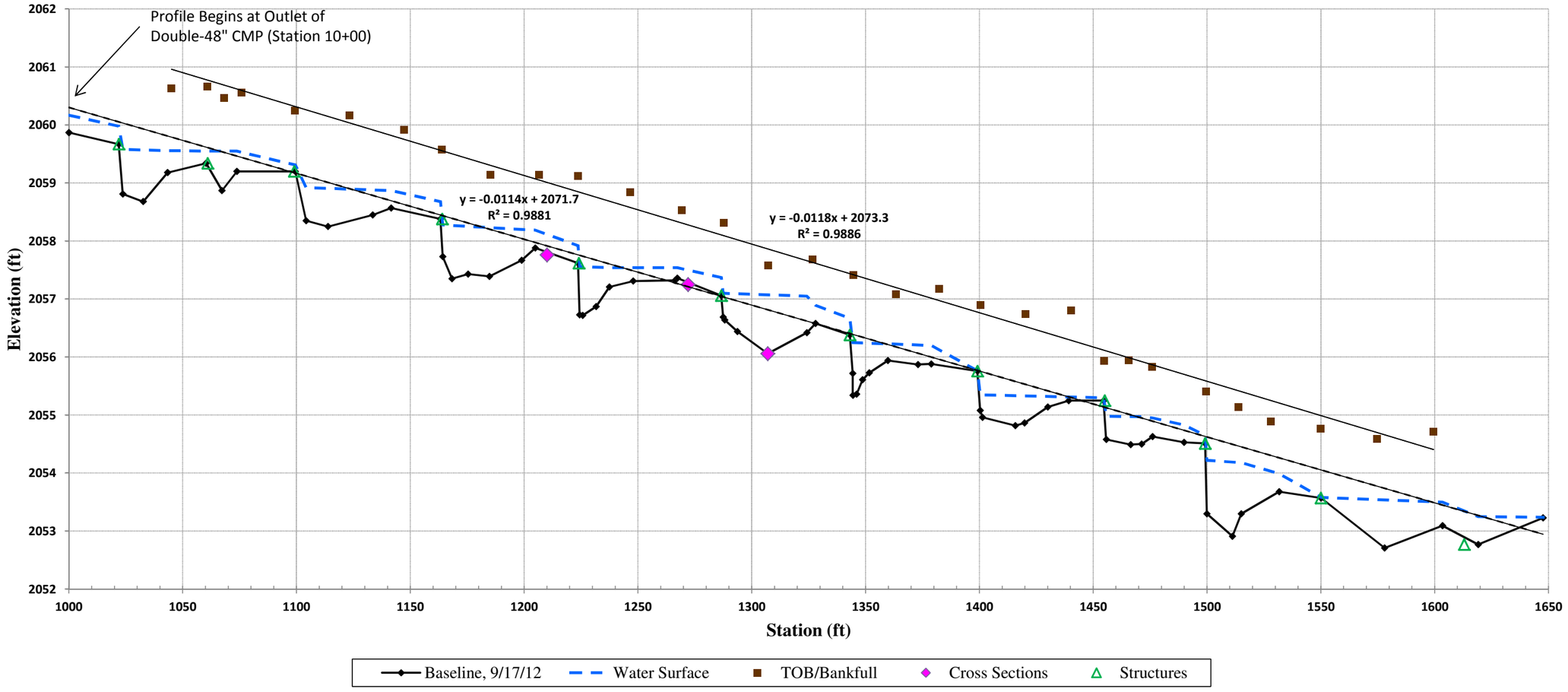
Longitudinal Profile
Fletcher - Upper Reach
Project Number - 138
Station 10+25.00 - 28+37.86



Longitudinal Profile
Fletcher - Lower Reach
Project Number - 138
Station 10+00.00 - 25+00.00



Longitudinal Profile
Fletcher - Tributary
Project Number - 138
Station 10+00.00 - 16+47.65



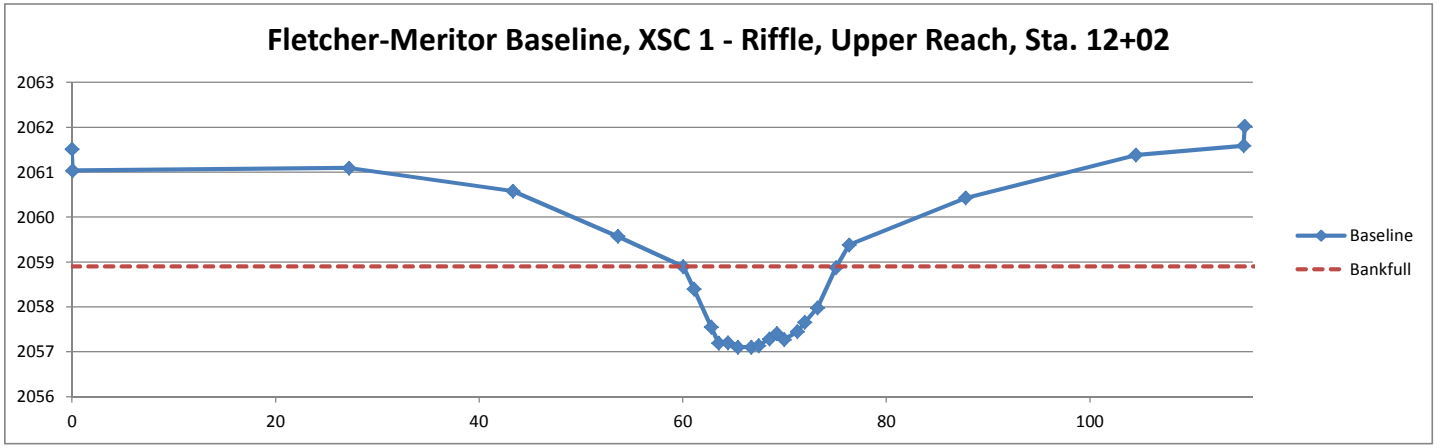
Station	Elevation
0	2061.51
0.08	2061.034
27.23	2061.091
43.32	2060.578
53.62	2059.57
60.05	2058.899
61.11	2058.396
62.79	2057.551
63.53	2057.192
64.44	2057.202
65.41	2057.1
66.72	2057.103
67.46	2057.136
68.51	2057.285
69.26	2057.406
69.97	2057.272
71.27	2057.452
71.99	2057.658
73.24	2057.978
75.06	2058.874
76.34	2059.384
87.78	2060.424
104.5	2061.381
115.1	2061.587
115.21	2062.021

Reach	Fletcher-Meritor, Upper Reach
River Basin	French Broad
Cross Section ID	XSC-1, Riffle, Upper Reach, 12+02
Drainage Area (Sq Mi)	0.75
Date	9/17/2012
Observers	B. Steffen, W. Yelverton

SUMMARY DATA	
Bankfull Elevation, ft	2058.90
Bankfull Cross Sectional Area, ft^2	19.10
Bankfull Width, ft	15.10
Max Depth at Bankfull, ft	1.80
Mean Depth at Bankfull, ft	1.26
Width/Depth Ratio	11.94
Flood Prone Width, ft	53.00
Flood Prone Area Elevation	2060.70
Entrenchment Ratio	3.50
Bank Height Ratio	1.00

Stream Type	C/E4

Sta. 12+02 Looking Downstream



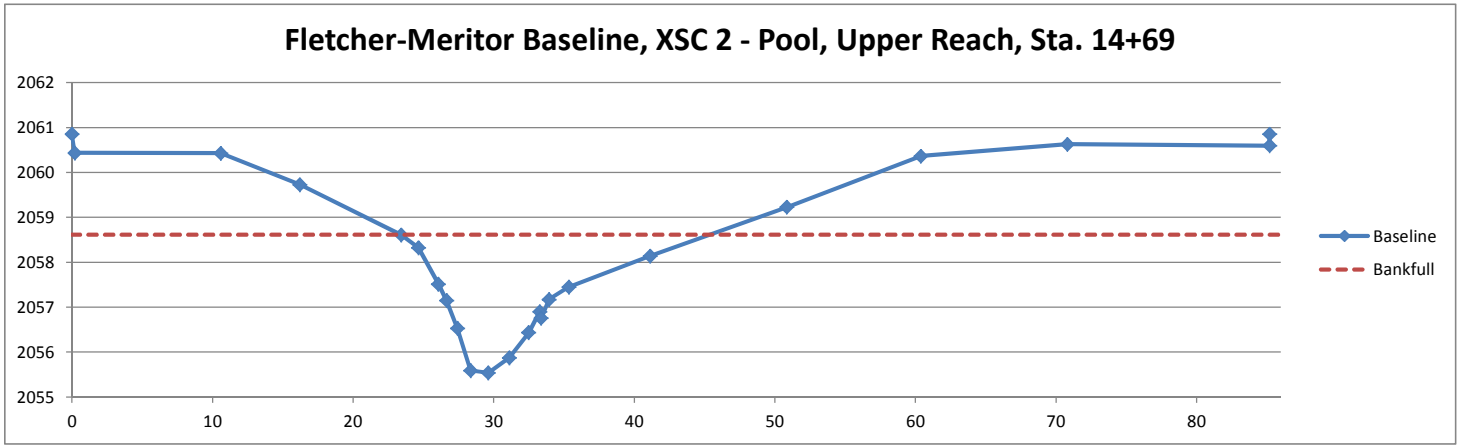
Station	Elevation
0	2060.851
0.2	2060.433
10.59	2060.428
16.22	2059.727
23.42	2058.61
24.65	2058.323
26.07	2057.514
26.65	2057.146
27.43	2056.526
28.36	2055.589
29.62	2055.537
31.12	2055.872
32.49	2056.434
33.28	2056.899
33.38	2056.753
33.93	2057.172
35.35	2057.448
41.13	2058.139
50.85	2059.225
60.38	2060.361
70.82	2060.626
85.2	2060.594
85.2	2060.854

Reach	Fletcher-Meritor, Upper Reach
River Basin	French Broad
Cross Section ID	XSC-2, Pool, Upper Reach, 14+69
Drainage Area (Sq Mi)	0.75
Date	9/17/2012
Observers	B. Steffen, W. Yelverton

SUMMARY DATA	
Bankfull Elevation, ft	2058.61
Bankfull Cross Sectional Area, ft^2	27.40
Bankfull Width, ft	21.90
Max Depth at Bankfull, ft	3.10
Mean Depth at Bankfull, ft	1.25
Width/Depth Ratio	17.50
Flood Prone Width, ft	>86.00
Flood Prone Area Elevation	2063.78
Entrenchment Ratio	>4.00
Bank Height Ratio	1.00

Stream Type	C/E4

Sta. 14+69 Looking Downstream



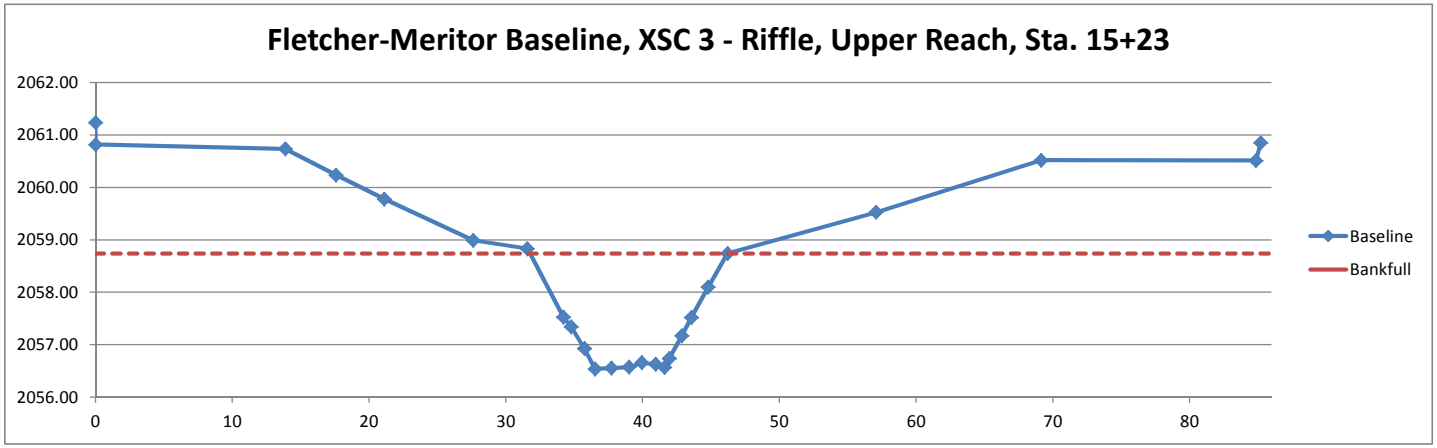
Station	Elevation
0	2061.24
0.01	2060.82
13.89	2060.73
17.59	2060.24
21.12	2059.78
27.62	2058.99
31.58	2058.83
34.21	2057.52
34.78	2057.34
35.76	2056.92
36.53	2056.54
37.72	2056.55
39.02	2056.57
39.96	2056.65
40.95	2056.62
41.61	2056.56
41.95	2056.74
42.87	2057.17
43.57	2057.52
44.8	2058.10
46.22	2058.74
57.07	2059.53
69.14	2060.52
84.86	2060.51
85.2	2060.85

Reach	Fletcher-Meritor, Upper Reach
River Basin	French Broad
Cross Section ID	XSC-3, Riffle, Upper Reach, 15+23
Drainage Area (Sq Mi)	0.75
Date	9/17/2012
Observers	B. Steffen, W. Yelverton

SUMMARY DATA	
Bankfull Elevation, ft	2058.74
Bankfull Cross Sectional Area, ft^2	21.30
Bankfull Width, ft	14.50
Max Depth at Bankfull, ft	2.20
Mean Depth at Bankfull, ft	1.47
Width/Depth Ratio	9.87
Flood Prone Width, ft	>86.00
Flood Prone Area Elevation	2060.95
Entrenchment Ratio	>6.00
Bank Height Ratio	1.00

Stream Type	C/E4

Sta. 15+23, Looking Downstream



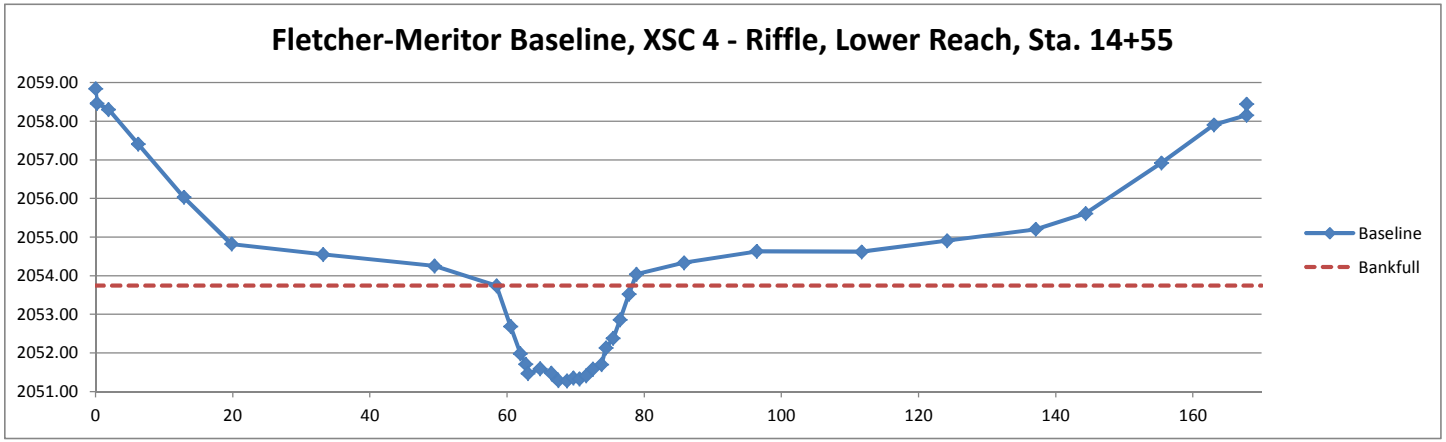
Station	Elevation
0	2058.84
0.22	2058.46
1.9	2058.30
6.21	2057.41
12.88	2056.03
19.83	2054.82
33.17	2054.55
49.42	2054.25
58.46	2053.74
60.53	2052.69
61.94	2051.98
62.71	2051.71
63.02	2051.46
64.81	2051.59
66.46	2051.47
67.49	2051.29
68.73	2051.28
69.67	2051.35
70.55	2051.32
71.53	2051.41
72.5	2051.59
73.76	2051.70
74.41	2052.13
75.47	2052.38
76.48	2052.86
77.77	2053.52
78.85	2054.04
85.81	2054.34
96.41	2054.63
111.7	2054.62
124.18	2054.91
137.09	2055.20
144.35	2055.61
155.43	2056.92
163.07	2057.91
167.81	2058.16
167.84	2058.44

Reach	Fletcher-Meritor, Lower Reach
River Basin	French Broad
Cross Section ID	XSC-4, Riffle, Lower Reach, 14+55
Drainage Area (Sq Mi)	1.1
Date	9/17/2012
Observers	B. Steffen, W. Yelverton

SUMMARY DATA	
Bankfull Elevation, ft	2053.74
Bankfull Cross Sectional Area, ft^2	34.50
Bankfull Width, ft	19.77
Max Depth at Bankfull, ft	2.47
Mean Depth at Bankfull, ft	1.75
Width/Depth Ratio	11.32
Flood Prone Width, ft	137.36
Flood Prone Area Elevation	2056.21
Entrenchment Ratio	6.95
Bank Height Ratio	1.00

Stream Type	C/E4

Sta. 14+55 Looking Downstream



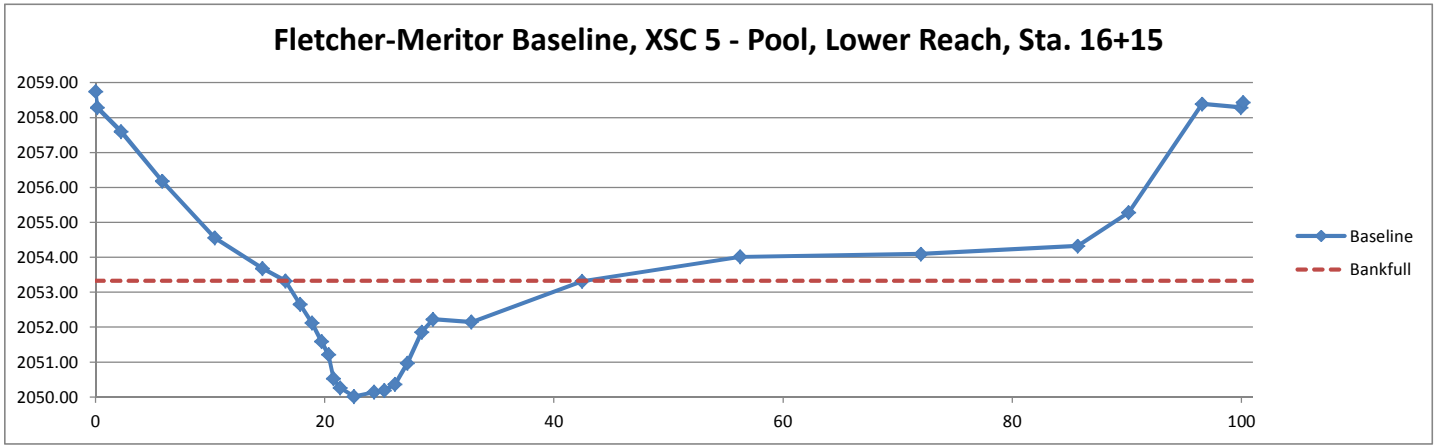
Station	Elevation
0	2058.74
0.16	2058.28
2.22	2057.60
5.83	2056.18
10.4	2054.55
14.56	2053.68
16.58	2053.32
17.86	2052.65
18.89	2052.12
19.72	2051.59
20.33	2051.21
20.77	2050.52
21.33	2050.26
22.54	2050.01
24.3	2050.14
25.19	2050.19
26.13	2050.36
27.2	2050.96
28.45	2051.86
29.45	2052.23
32.8	2052.14
42.46	2053.31
56.25	2054.01
72.02	2054.09
85.7	2054.32
90.16	2055.28
96.56	2058.39
99.94	2058.29
100.14	2058.43

Reach	Fletcher-Meritor, Lower Reach
River Basin	French Broad
Cross Section ID	XSC-5, Pool, Lower Reach, 16+15
Drainage Area (Sq Mi)	1.1
Date	9/17/2012
Observers	B. Steffen, W. Yelverton

SUMMARY DATA	
Bankfull Elevation, ft	2053.32
Bankfull Cross Sectional Area, ft^2	37.88
Bankfull Width, ft	26.16
Max Depth at Bankfull, ft	3.31
Mean Depth at Bankfull, ft	1.45
Width/Depth Ratio	18.07
Flood Prone Width, ft	83.70
Flood Prone Area Elevation	2055.67
Entrenchment Ratio	3.20
Bank Height Ratio	1.00

Stream Type	C/E4

Sta. 16+15 Looking Downstream



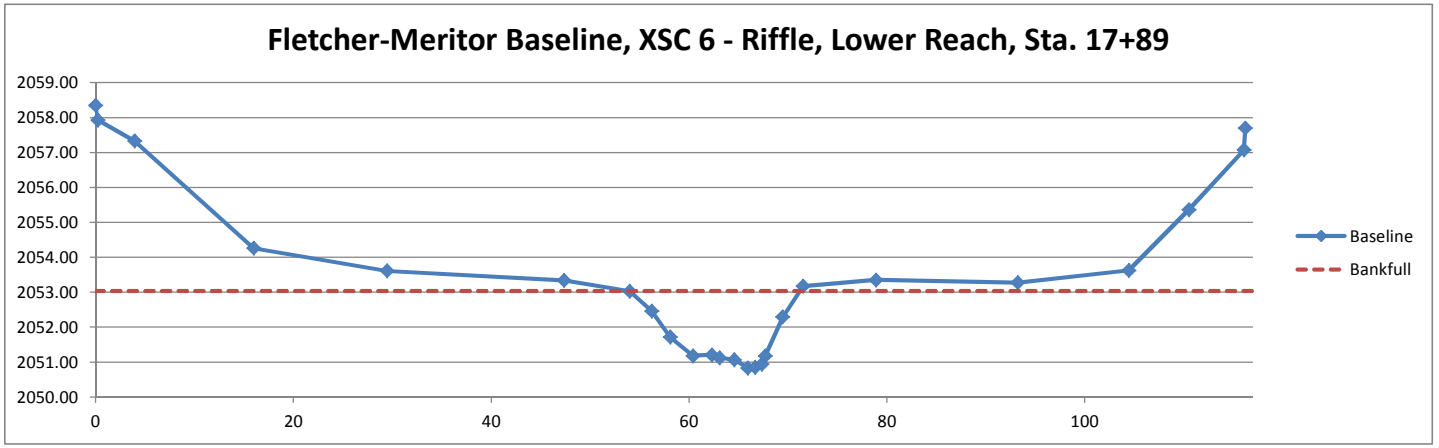
Station	Elevation
0	2058.35
0.23	2057.93
3.94	2057.33
15.98	2054.26
29.48	2053.61
47.38	2053.34
54	2053.03
56.23	2052.46
58.11	2051.71
60.39	2051.18
62.3	2051.20
63.08	2051.12
64.58	2051.07
65.95	2050.83
66.69	2050.85
67.35	2050.94
67.72	2051.18
69.47	2052.29
71.53	2053.17
78.91	2053.35
93.25	2053.27
104.46	2053.62
110.54	2055.36
116.1	2057.07
116.25	2057.70

Reach	Fletcher-Meritor, Lower Reach
River Basin	French Broad
Cross Section ID	XSC-6, Riffle, Lower Reach, 17+89
Drainage Area (Sq Mi)	1.1
Date	9/17/2012
Observers	B. Steffen, W. Yelverton

SUMMARY DATA	
Bankfull Elevation, ft	2053.03
Bankfull Cross Sectional Area, ft^2	23.40
Bankfull Width, ft	17.20
Max Depth at Bankfull, ft	2.20
Mean Depth at Bankfull, ft	1.36
Width/Depth Ratio	12.65
Flood Prone Width, ft	97.90
Flood Prone Area Elevation	2055.23
Entrenchment Ratio	5.69
Bank Height Ratio	1.00

Stream Type	C/E4

Sta. 17+89 Looking Upstream



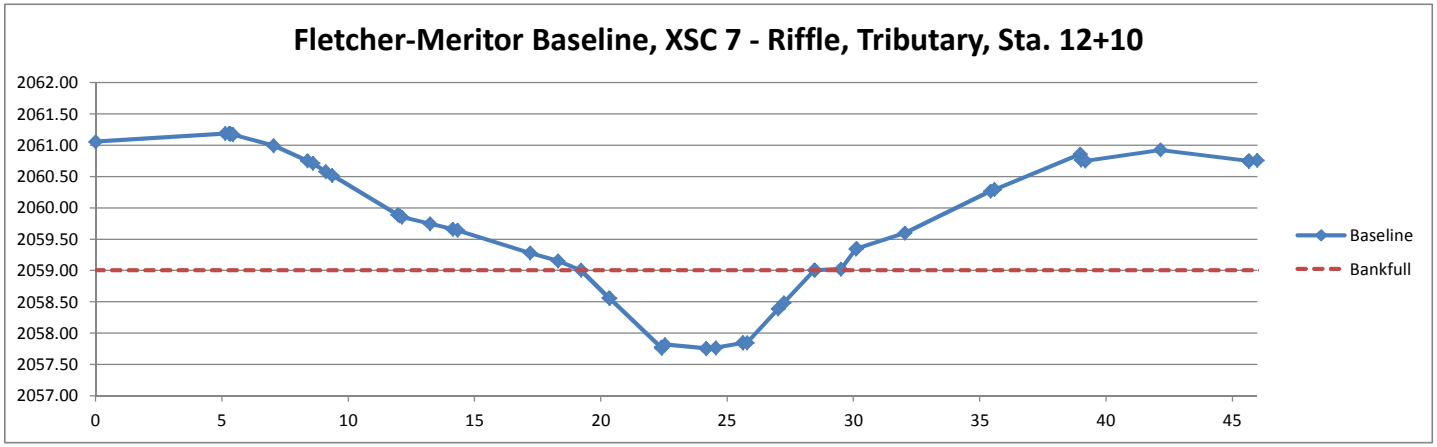
Station	Elevation
0	2061.05
5.129	2061.19
5.282	2061.19
5.298	2061.19
5.307	2061.19
5.32	2061.18
5.347	2061.18
5.443	2061.17
7.048	2061.00
8.394	2060.75
8.609	2060.71
9.109	2060.58
9.369	2060.52
11.955	2059.89
12.043	2059.87
12.12	2059.86
13.24	2059.75
14.142	2059.66
14.329	2059.64
17.2	2059.28
18.305	2059.15
19.221	2059.00
20.316	2058.56
20.363	2058.55
22.398	2057.77
22.407	2057.76
22.536	2057.81
24.166	2057.75
24.174	2057.75
24.549	2057.76
25.613	2057.84
25.623	2057.84
25.794	2057.85
27.017	2058.39
27.249	2058.49
28.455	2059.00
28.483	2059.00
29.509	2059.02
30.102	2059.34
30.127	2059.35
32.041	2059.60
35.432	2060.27
35.585	2060.29
38.977	2060.86
39.02	2060.76
39.176	2060.75
42.156	2060.93
45.653	2060.75
45.653	2060.75

Reach	Fletcher-Meritor, Tributary
River Basin	French Broad
Cross Section ID	XSC-7, Riffle, Tributary, 12+10
Drainage Area (Sq Mi)	0.32
Date	9/17/2012
Observers	B. Steffen, W. Yelverton

SUMMARY DATA	
Bankfull Elevation, ft	2059.00
Bankfull Cross Sectional Area, ft^2	7.63
Bankfull Width, ft	9.24
Max Depth at Bankfull, ft	1.25
Mean Depth at Bankfull, ft	0.83
Width/Depth Ratio	11.19
Flood Prone Width, ft	24.91
Flood Prone Area Elevation	2060.25
Entrenchment Ratio	2.70
Bank Height Ratio	1.00

Stream Type	C/E4

Sta. 12+10 Looking Downstream



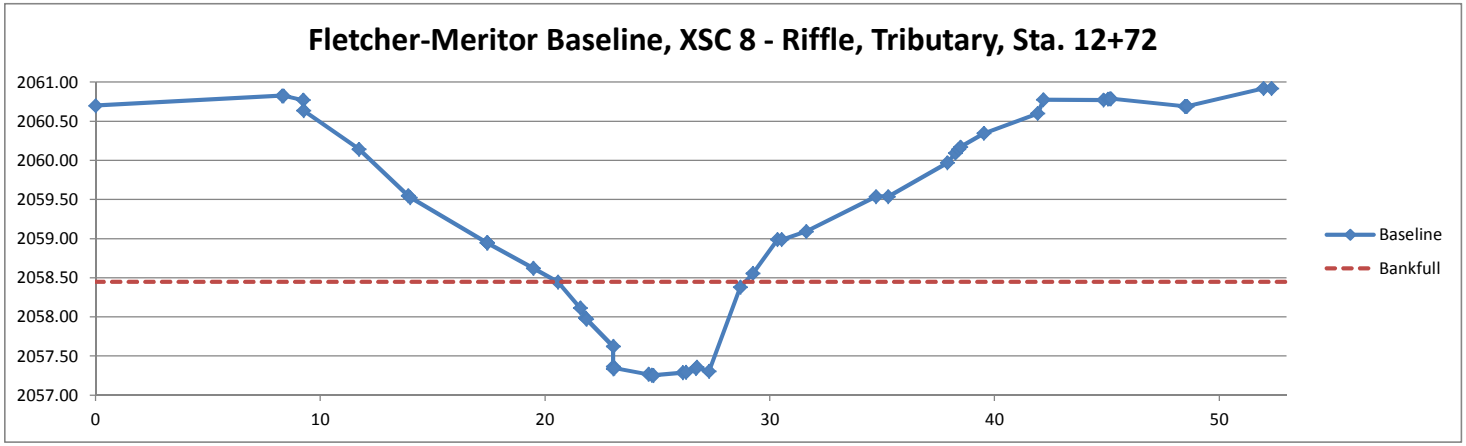
Station	Elevation
0	2060.70
8.299	2060.82
8.364	2060.83
9.237	2060.77
9.261	2060.64
11.727	2060.14
13.916	2059.55
14.003	2059.53
17.42	2058.95
17.426	2058.95
17.427	2058.95
17.431	2058.95
19.481	2058.62
20.572	2058.45
21.569	2058.11
21.808	2057.99
21.843	2057.97
23.033	2057.62
23.037	2057.34
23.047	2057.37
23.082	2057.35
24.6	2057.27
24.749	2057.26
24.823	2057.25
26.129	2057.29
26.278	2057.29
26.711	2057.34
26.752	2057.36
27.296	2057.30
28.691	2058.38
29.254	2058.56
30.344	2058.99
30.536	2058.99
31.628	2059.09
34.73	2059.54
35.276	2059.54
37.907	2059.97
38.256	2060.09
38.405	2060.14
38.49	2060.17
39.524	2060.35
41.922	2060.60
42.18	2060.77
44.846	2060.77
45.057	2060.78
45.137	2060.79
45.183	2060.79
48.467	2060.689
48.511	2060.689

Reach	Fletcher-Meritor, Tributary
River Basin	French Broad
Cross Section ID	XSC-8, Riffle, Tributary, 12+72
Drainage Area (Sq Mi)	0.32
Date	9/17/2012
Observers	B. Steffen, W. Yelverton

SUMMARY DATA	
Bankfull Elevation, ft	2058.45
Bankfull Cross Sectional Area, ft^2	6.80
Bankfull Width, ft	8.33
Max Depth at Bankfull, ft	1.19
Mean Depth at Bankfull, ft	0.82
Width/Depth Ratio	10.21
Flood Prone Width, ft	22.32
Flood Prone Area Elevation	2059.64
Entrenchment Ratio	2.68
Bank Height Ratio	1.00

Stream Type	C/E4

Sta. 12+72 Looking downstream



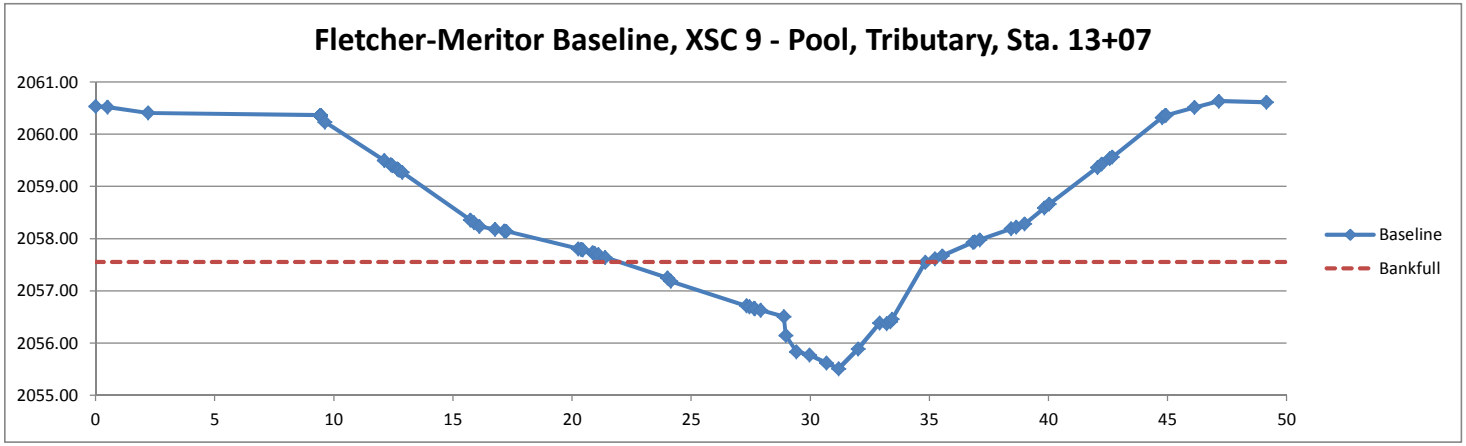
Station	Elevation
0	2060.53
0.504	2060.52
2.209	2060.41
9.427	2060.36
9.427	2060.36
9.427	2060.36
9.428	2060.36
9.428	2060.36
9.428	2060.36
9.428	2060.36
9.429	2060.36
9.429	2060.36
9.429	2060.36
9.43	2060.36
9.43	2060.36
9.43	2060.36
9.431	2060.36
9.433	2060.36
9.627	2060.23
12.119	2059.50
12.393	2059.42
12.453	2059.40
12.657	2059.34
12.687	2059.33
12.741	2059.31
12.87	2059.27
15.726	2058.36
15.886	2058.31
16.113	2058.23
16.765	2058.18
17.152	2058.15
17.23	2058.15
20.261	2057.81
20.382	2057.79
20.447	2057.79
20.864	2057.73
20.94	2057.72
21.11	2057.69
21.39	2057.64
24.005	2057.25
24.142	2057.18
27.325	2056.71
27.448	2056.70
27.637	2056.66
27.674	2056.66
27.915	2056.63
28.89	2056.51
28.977	2056.15
29.415	2055.83

Reach	Fletcher-Meritor, Tributary
River Basin	French Broad
Cross Section ID	XSC-9, Pool, Tributary, 13+07
Drainage Area (Sq Mi)	0.32
Date	9/17/2012
Observers	B. Steffen, W. Yelverton

SUMMARY DATA	
Bankfull Elevation, ft	2057.55
Bankfull Cross Sectional Area, ft^2	11.96
Bankfull Width, ft	12.81
Max Depth at Bankfull, ft	2.04
Mean Depth at Bankfull, ft	0.93
Width/Depth Ratio	13.71
Flood Prone Width, ft	25.89
Flood Prone Area Elevation	2058.77
Entrenchment Ratio	2.02
Bank Height Ratio	1.00

Stream Type	C/E4

Sta. 13+07 Looking Upstream, in foreground



Upper Reach Photo Station 1 Downstream (9/16/2012 Year 0)

Upper Reach Photo Station 1 Upstream (9/16/2012 Year 0)

Upper Reach Photo Station 2 Downstream (9/16/2012 Year 0)

Upper Reach Photo Station 2 Upstream (9/16/2012 Year 0)

Upper Reach Photo Station 3 Downstream (9/16/2012 Year 0)

Upper Reach Photo Station 3 Upstream (9/16/2012 Year 0)

Upper Reach Photo Station 4 Downstream (9/16/2012 Year 0)

Upper Reach Photo Station 4 Upstream (9/16/2012 Year 0)

Upper Reach Photo Station 5 Downstream (9/16/2012 Year 0)

Upper Reach Photo Station 5 Upstream (9/16/2012 Year 0)

Upper Reach Photo Station 6 Downstream (9/16/2012 Year 0)

Upper Reach Photo Station 6 Upstream (9/16/2012 Year 0)

Upper Reach Photo Station 7 Downstream (9/16/2012 Year 0)

Upper Reach Photo Station 7 Upstream (9/16/2012 Year 0)

Upper Reach Photo Station 8 Downstream (9/16/2012 Year 0)

Upper Reach Photo Station 8 Upstream (9/16/2012 Year 0)

Upper Reach Photo Station 9 Downstream (9/16/2012 Year 0)

Upper Reach Photo Station 9 Upstream (9/16/2012 Year 0)

Upper Reach Photo Station 10 Downstream (9/16/2012 Year 0)

Upper Reach Photo Station 10 Upstream (9/16/2012 Year 0)

Upper Reach Photo Station 11 Downstream (9/16/2012 Year 0)

Upper Reach Photo Station 11 Upstream (9/16/2012 Year 0)

Upper Reach Photo Station 12 Downstream (9/16/2012 Year 0)

Upper Reach Photo Station 12 Upstream (9/16/2012 Year 0)

Upper Reach Photo Station 13 Downstream (9/16/2012 Year 0)

Upper Reach Photo Station 13 Upstream (9/16/2012 Year 0)

Upper Reach Photo Station 14 Downstream (9/16/2012 Year 0)

Upper Reach Photo Station 14 Upstream (9/16/2012 Year 0)

Upper Reach Photo Station 15 Downstream (9/16/2012 Year 0)

Upper Reach Photo Station 15 Upstream (9/16/2012 Year 0)

Upper Reach Photo Station 16 Downstream (9/16/2012 Year 0)

Upper Reach Photo Station 16 Upstream (9/16/2012 Year 0)

Upper Reach Photo Station 17 Downstream (9/16/2012 Year 0)

Upper Reach Photo Station 17 Upstream (9/16/2012 Year 0)

Upper Reach Photo Station 18 Downstream (9/16/2012 Year 0)

Upper Reach Photo Station 18 Upstream (9/16/2012 Year 0)

Upper Reach Photo Station 19 Downstream (9/16/2012 Year 0)

Upper Reach Photo Station 19 Upstream (9/16/2012 Year 0)

Upper Reach Photo Station 20 Downstream (9/16/2012 Year 0)

Upper Reach Photo Station 20 Upstream (9/16/2012 Year 0)

Upper Reach Photo Station 21 Downstream (9/16/2012 Year 0)

Upper Reach Photo Station 21 Upstream (9/16/2012 Year 0)

Upper Reach Photo Station 22 Downstream (9/16/2012 Year 0)

Upper Reach Photo Station 22 Upstream (9/16/2012 Year 0)

Upper Reach Photo Station 23 Downstream (9/16/2012 Year 0)

Upper Reach Photo Station 23 Upstream (9/16/2012 Year 0)

Confluence with Cane Creek (9/16/2012 Year 0)

Looking upstream of Confluence with Cane Creek (9/16/2012 Year 0)

Lower Reach Photo Station 1 Downstream (9/16/2012 Year 0)

Lower Reach Photo Station 1 Upstream (9/16/2012 Year 0)

Lower Reach Photo Station 2 Downstream (9/16/2012 Year 0)

Lower Reach Photo Station 2 Upstream (9/16/2012 Year 0)

Lower Reach Photo Station 3 Downstream (9/16/2012 Year 0)

Lower Reach Photo Station 3 Upstream (9/16/2012 Year 0)

Lower Reach Photo Station 4 Downstream (9/16/2012 Year 0)

Lower Reach Photo Station 4 Upstream (9/16/2012 Year 0)

Lower Reach Photo Station 5 Downstream (9/16/2012 Year 0)

Lower Reach Photo Station 5 Upstream (9/16/2012 Year 0)

Lower Reach Photo Station 6 Downstream (9/16/2012 Year 0)

Lower Reach Photo Station 6 Upstream (9/16/2012 Year 0)

Lower Reach Photo Station 7 Downstream (9/16/2012 Year 0)

Lower Reach Photo Station 7 Upstream (9/16/2012 Year 0)

Lower Reach Photo Station 8 Downstream (9/16/2012 Year 0)

Lower Reach Photo Station 8 Upstream (9/16/2012 Year 0)

Lower Reach Photo Station 9 Downstream (9/16/2012 Year 0)

Lower Reach Photo Station 9 Upstream (9/16/2012 Year 0)

Lower Reach Photo Station 10 Downstream (9/16/2012 Year 0)

Lower Reach Photo Station 10 Upstream (9/16/2012 Year 0)

Lower Reach Photo Station 11 Downstream (9/16/2012 Year 0)

Lower Reach Photo Station 11 Upstream (9/16/2012 Year 0)

Lower Reach Photo Station 12 Downstream (9/16/2012 Year 0)

Lower Reach Photo Station 12 Upstream (9/16/2012 Year 0)

Lower Reach Photo Station 13 Downstream (9/16/2012 Year 0)

Lower Reach Photo Station 13 Upstream (9/16/2012 Year 0)

Lower Reach Photo Station 14 Downstream (9/16/2012 Year 0)

Lower Reach Photo Station 14 Upstream (9/16/2012 Year 0)

Lower Reach Photo Station 15 Downstream (9/16/2012 Year 0)

Lower Reach Photo Station 15 Upstream (9/16/2012 Year 0)

Lower Reach Photo Station 16 Downstream (9/16/2012 Year 0)

Lower Reach Photo Station 16 Upstream (9/16/2012 Year 0)

Tributary Reach Photo Station 1 & 2 Downstream (9/16/2012 Year 0)

Tributary Reach Photo Station 1 & 2 Upstream (9/16/2012 Year 0)

Tributary Reach Photo Station 3 Downstream (9/16/2012 Year 0)

Tributary Reach Photo Station 3 Upstream (9/16/2012 Year 0)

Tributary Reach Photo Station 4 Downstream (9/16/2012 Year 0)

Tributary Reach Photo Station 4 Upstream (9/16/2012 Year 0)

Tributary Reach Photo Station 5 Downstream (9/16/2012 Year 0)

Tributary Reach Photo Station 5 Upstream (9/16/2012 Year 0)

Tributary Reach Photo Station 6 Downstream (9/16/2012 Year 0)

Tributary Reach Photo Station 6 Upstream (9/16/2012 Year 0)

Tributary Reach Photo Station 7 Downstream (9/16/2012 Year 0)

Tributary Reach Photo Station 7 Upstream (9/16/2012 Year 0)

Tributary Reach Photo Station 8 Downstream (9/16/2012 Year 0)

Tributary Reach Photo Station 8 Upstream (9/16/2012 Year 0)

Tributary Reach Photo Station 9 Downstream (9/16/2012 Year 0)

Tributary Reach Photo Station 9 Upstream (9/16/2012 Year 0)

Tributary Reach Photo Station 10 Downstream (9/16/2012 Year 0)

Tributary Reach Photo Station 10 Upstream (9/16/2012 Year 0)

Tributary Reach Photo Station 11 Downstream (9/16/2012 Year 0)

Tributary Reach Photo Station 11 Upstream (9/16/2012 Year 0)

Tributary Reach Photo Station 12 Downstream (9/16/2012 Year 0)

Tributary Reach Photo Station 12 Upstream (9/16/2012 Year 0)

Appendix C

Vegetation Data

Table 7a. Vegetation Plot Attribute Data Fletcher-Meritor Site (UT to Cane Creek) Stream and Wetland Restoration/Project No. 138				
Plot ID	**Community Type**	**Planting Zone ID**	**Reach ID**	**CVS Level**
138-00-0001	Riparian/Wetland	Zone 3	Trib	II
138-00-0002	Riparian/Wetland	Zone 3	Trib	II
138-00-0003	Riparian/Wetland	Zone 3	Trib	II
138-00-0004	Riparian	Zones 2 and 3	Upper	II
138-00-0005	Riparian	Zones 2 and 3	Upper	II
138-00-0006	Riparian/Wetland	Zones 2 and 3	Upper	II
138-00-0007	Riparian	Zones 2 and 3	Upper	II
138-00-0008	Riparian/Wetland	Zones 2 and 3	Upper	II
138-00-0009	Riparian	Zones 2 and 3	Upper	II
138-00-0010	Riparian/Wetland	Zones 2 and 3	Upper	II
138-00-0011	Riparian	Zone 2	Lower	II
138-00-0012	Riparian	Zone 2	Lower	II
138-00-0013	Riparian	Zone 2	Lower	II
138-00-0014	Riparian	Zone 2	Lower	II
138-00-0015	Riparian	Zone 2	Lower	II
138-00-0016	Riparian	Zone 2	Lower	II
138-00-0017	Riparian	Zone 2	Lower	II

Table 7b. Planted Vegetation Fletcher-Meritor Site (UT to Cane Creek) Stream and Wetland Restoration/Project No. 138			
Species	**Common Name**	**Size**	**Quantity**
Alnus serrulta	Tag alder	Gallon	138
Asimina triloba	Paw Paw	Gallon	20
Betula nigra	River birch	Gallon	85
Callicarpa americana	Beautyberry	Gallon	10
Calycanthus floridus	Sweetshrub	Gallon	28
Cephalantus occidentalis	Button bush	Gallon	25
Itea virginica	Virginia sweetspire	Gallon	28
Lindera benzoin	Spicebush	Gallon	28
Sambucus canadensis	Elderberry	Gallon	26
Symphoricarpos orbiculatus	Coral-berry	Gallon	28
Acer negundo	Box Elder	Bare root	300
Acer rubrum	Red maple	Bare root	3000
Carpinus caroliniana	American hornbeam	Bare root	800
Carya cordiformis	Bitternut hickory	Bare root	500
Cornus amomum	Silky dogwood	Bare root	300
Hamamelis virginiana	Witchhazel	Bare root	600
Juglans nigra	Black walnut	Bare root	600
Quercus alba	White oak	Bare root	300
Quercus palustris	Pin oak (on ticket)	Bare root	500
Quercus phellos	Willow oak	Bare root	1000
Cornus amomum	Silky dogwood	Live stakes	2500
Physocarpus opulifolius	Ninebark	Live stakes	550
Salix nigra	Black willow	Live stakes	500
Salix sericea	Silky willow	Live stakes	2500
Sambucus canadensis	Elderberry	Live stakes	500
		Total	**14866**

Table 8. CVS Vegetation Plot Metadata

Report Prepared By	Vickie Miller
Date Prepared	4/2/2013 11:09
database name	cvs-eep-entrytool-v2.3.1.mdb
database location	C:\Users\vimiller\Desktop
computer name	RALE-12116343
file size	36184064

DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------

Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
ALL Stems by Plot and spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.

PROJECT SUMMARY----------

Project Code	138
project Name	Fletcher-Meritor Site
Description	Wetland and Stream mitigation in Henderson County, NC.
River Basin	French Broad
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	17

Table 9. Vegetation Plot Data
Fletcher-Meritor Site (UT to Cane Creek) Stream and Wetland Restoration/Project No. 138

Species	Common Name	Species Type	Total Stems in Plots	Total Planted Stems in Plots	Avg # Total Stems / Plot	Avg # stems Planted / Plot	138-00-0001-year:2012		138-00-0002-year:2012		138-00-0003-year:2012		138-00-0004-year:2012		138-00-0005-year:2012		138-00-0006-year:2012		138-00-0007-year:2012		138-00-0008-year:2012		138-00-0009-year:2012		138-00-0010-year:2012		138-00-0011-year:2012		138-00-0012-year:2012		138-00-0013-year:2012		138-00-0014-year:2012		138-00-00115year:2012		138-00-0016-year:2012		138-00-0017-year:2012		
							P	V	P	V	P	V	P	V	P	V	P	V	P	V	P	V	P	V	P	V	P	V	P	V	P	V	P	V	P	V	P	V	
Acer negundo	boxelder	Shrub	22	22	1.3	1.3					1				3				2				1		1		2		3		2		1				2		4		
Betula nigra	river birch	Tree	251	26	14.8	1.5	1				1		3		1				2		2						3		3		2		3		3		1	25	1	200	251
Cornus amomum	silky dogwood	Shrub	30	30	1.8	1.8									1												1		5		5		4		10		3		1		
Fraxinus pennsylvanica	green ash	Tree	36	36	2.1	2.1	2		3		3		5				3		3		3		2		3		2				1		4						2		
Juglans nigra	black walnut	Tree	6	6	0.4	0.4	1						1		2				1				1																		
Platanus occidentalis	American sycamore	Tree	70	35	4.1	2.1	1		4				5		4	22	4	7	1		1		2		5		2	6			2				1		3				
Sambucus canadensis	common elderberry	Shrub	1	1	0.1	0.1																					1														
Unknown			4	4	0.2	0.2	1		1				1						1																						
Stem Count			**420**	**160**																																				
Species Count							**6**	**0**	**8**	**0**	**5**	**0**	**15**	**0**	**11**	**22**	**7**	**7**	**10**	**0**	**6**	**0**	**6**	**0**	**9**	**0**	**11**	**6**	**11**	**0**	**12**	**0**	**12**	**0**	**14**	**0**	**9**	**25**	**8**	**200**	
Planted Stems / acre							**243**		**324**		**203**		**608**		**446**		**284**		**405**		**243**		**243**		**365**		**446**		**446**		**486**		**486**		**567**		**365**		**324**		
Total Stems							**6**		**8**		**5**		**15**		**33**		**14**		**10**		**6**		**6**		**9**		**17**		**11**		**12**		**12**		**14**		**34**		**208**		
Total Stems / acre							**243**		**324**		**203**		**608**		**1337**		**567**		**405**		**243**		**243**		**365**		**689**		**446**		**486**		**486**		**567**		**1377**		**8424**		

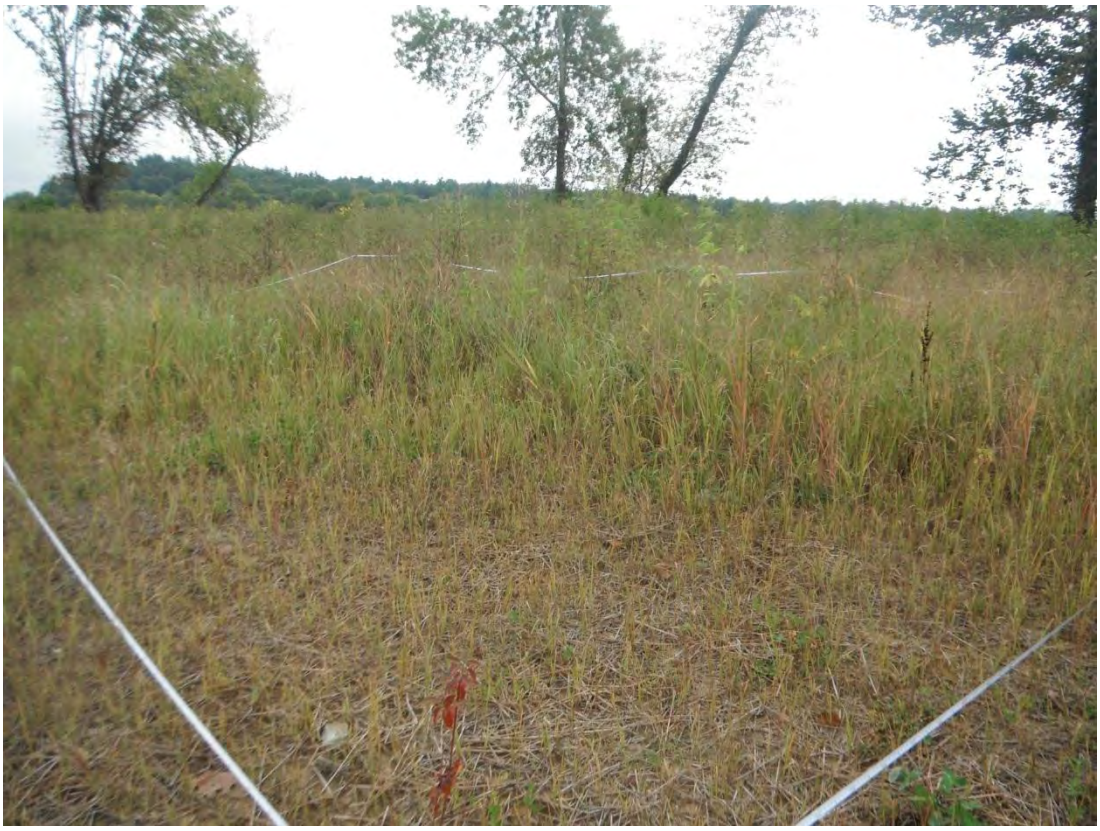
*P – Planted, V – Volunteer

Vegetation Plot 1 – 10m x 10m (9/17/2012 Year 0)

Vegetation Plot 2 – 10m x 10m (9/17/2012 Year 0)

Vegetation Plot 3 – 10m x 10m (9/17/2012 Year 0)

Vegetation Plot 4 – 10m x 10m (9/17/2012 Year 0)



Vegetation Plot 5 – 10m x 10m (9/17/2012 Year 0)

Vegetation Plot 6 – 10m x 10m (9/17/2012 Year 0)

Vegetation Plot 7 – 10m x 10m (9/17/2012 Year 0)

Vegetation Plot 8 – 10m x 10m (9/17/2012 Year 0)

Vegetation Plot 9 – 10m x 10m (9/17/2012 Year 0)

Vegetation Plot 10 – 10m x 10m (9/17/2012 Year 0)

Vegetation Plot 11 – 10m x 10m (9/18/2012 Year 0)

Vegetation Plot 12 – 10m x 10m (9/18/2012 Year 0)

Vegetation Plot 13 – 10m x 10m (9/18/2012 Year 0)

Vegetation Plot 14 – 10m x 10m (9/18/2012 Year 0)

Vegetation Plot 15 – 10m x 10m (9/18/2012 Year 0)

Vegetation Plot 16 – 10m x 10m (9/18/2012 Year 0)

Vegetation Plot 17 – 10m x 10m (9/18/2012 Year 0)

Appendix D

Record Drawings and Final Report

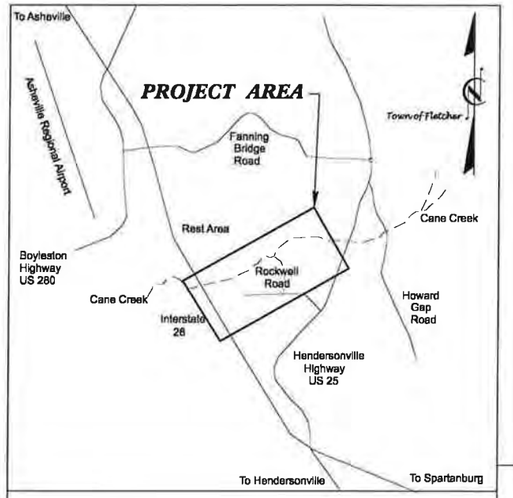
STATE	SCO PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	040630201	1	

STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM

Unnamed Tributary to Cane Creek
Stream Restoration Project

LOCATION: HENDERSON COUNTY, NORTH CAROLINA
Latitude 37.841873, Longitude 83.902224

RECORD DRAWINGS

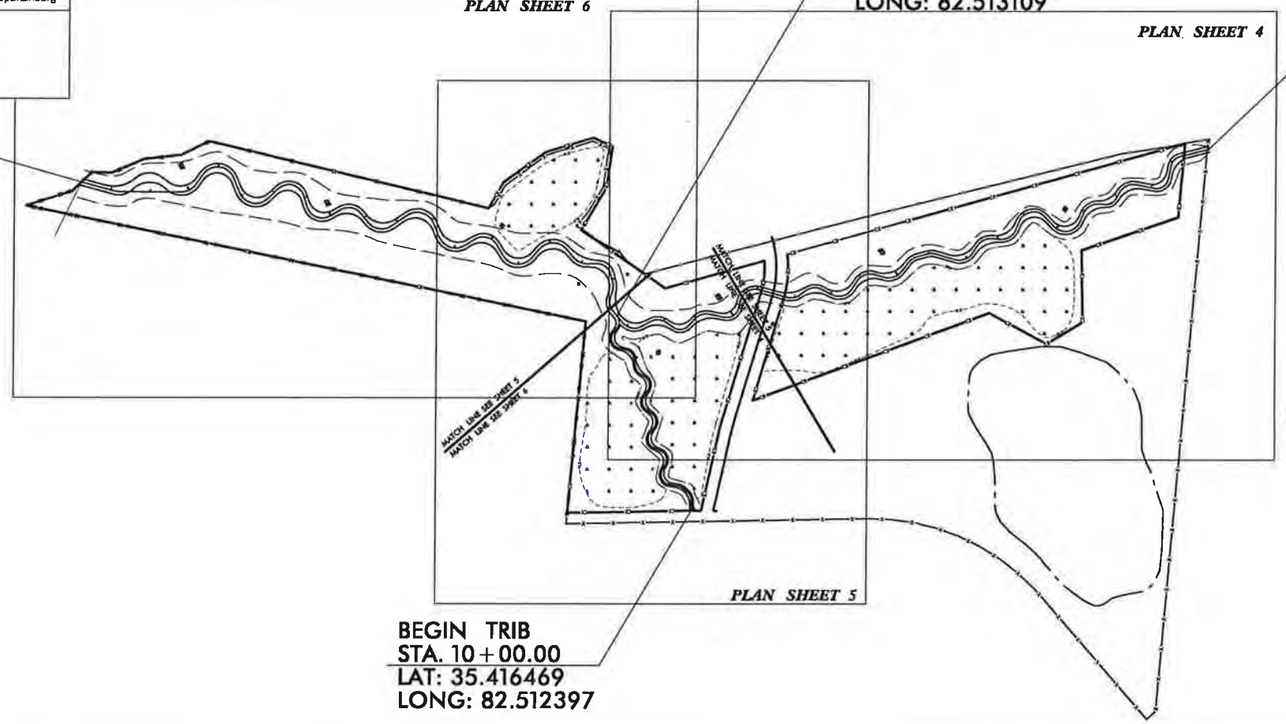


LOCATION MAP

END UPPER REACH
STA. 28+37.86
END TRIB
STA.16+47.65
BEGIN LOWER REACH
STA.10+00.00
LAT: 35.417804
LONG: 82.513109

BEGIN UPPER REACH
STA. 10+00.00
LAT: 35.419113
LONG:82.508101

END LOWER REACH
STA. 28+01.88
LAT: 35.418600
LONG:82.517739

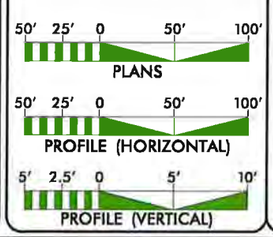


BEGIN TRIB
STA. 10+00.00
LAT: 35.416469
LONG: 82.512397

INDEX OF SHEETS

SCO PROJECT#: 040630201

GRAPHIC SCALES



DESIGN DATA

	UPPER	LOWER	TRIB
DESIGN STREAM TYPE	C/E4	C/E4	C/E4
BANKFULL AREA (SQ. FT)	21.13	27.13	7.61
BANKFULL WIDTH (FT)	15.00	17.00	9.00
BANKFULL DEPTH (FT)	1.50	1.70	0.90
WIDTH/DEPTH RATIO	10.00	10.00	10.00

PROJECT DATA

PRE-CONSTRUCTION STREAM LENGTH	=	3,549 LN. FEET
CONSTRUCTED PRIORITY II STREAM LENGTH (LOWER REACH)	=	1,779 LN. FEET
CONSTRUCTED PRIORITY II STREAM LENGTH (UPPER REACH)	=	1,838 LN. FEET
CONSTRUCTED PRIORITY II STREAM LENGTH (TRIBUTARY)	=	648 LN. FEET
WETLAND RESTORATION (ANTICIPATED)	=	6.7 ACRES

Prepared for:
Ecosystem Enhancement Program

Prepared in the Office of:
HDR Engineering, Inc. of the Carolinas
3733 National Drive, Suite 207 Raleigh, N.C. 27612

DEBORAH DANIEL
EEP PROJECT MANAGER

LIN XU
EEP REVIEW COORDINATOR

JONATHAN HENDERSON, P.E.
HDR PROJECT MANAGER

WYATT D. YELVERTON, P.E.
HDR PROJECT DESIGN ENGINEER

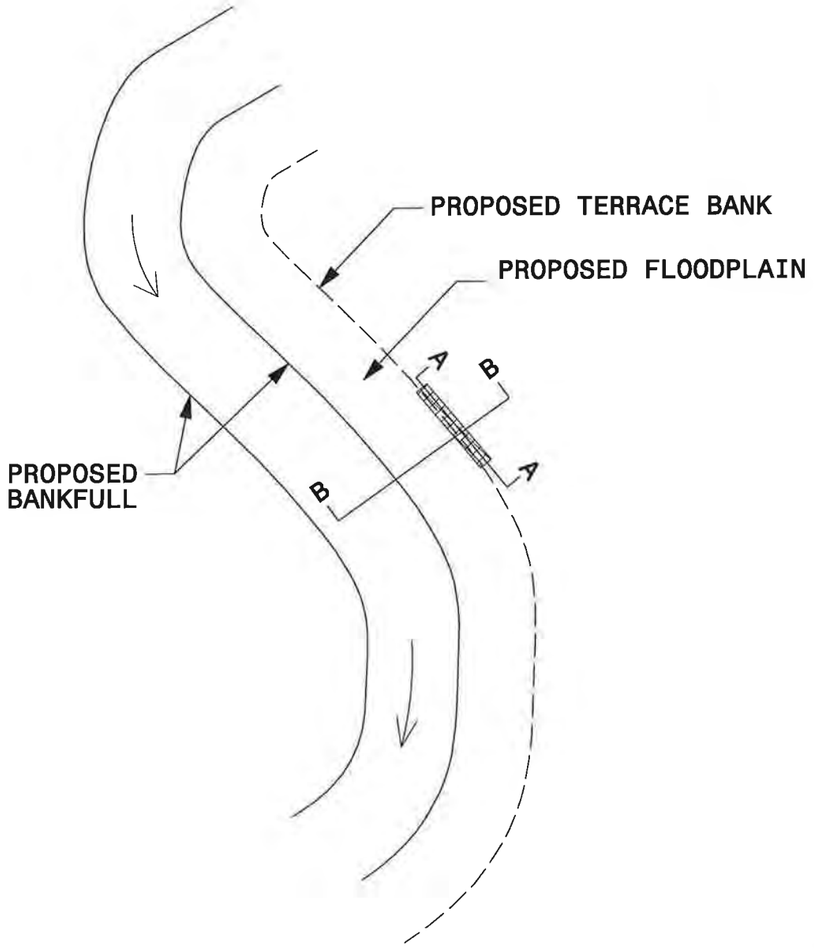
PROJECT DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 037526 ENGINEER WYATT D. YELVERTON

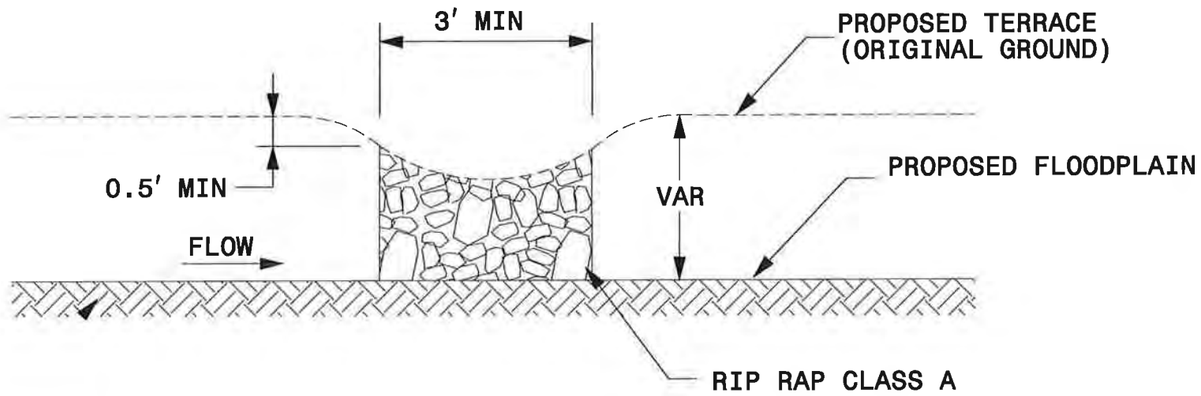
SIGNATURE: P.E. 5/16/12

8/16/2012
R:\Projects\20671 Fletcher\2. Construction\4a Builts\Plansheets\Fletcher_asbuilt_tsh.dgn

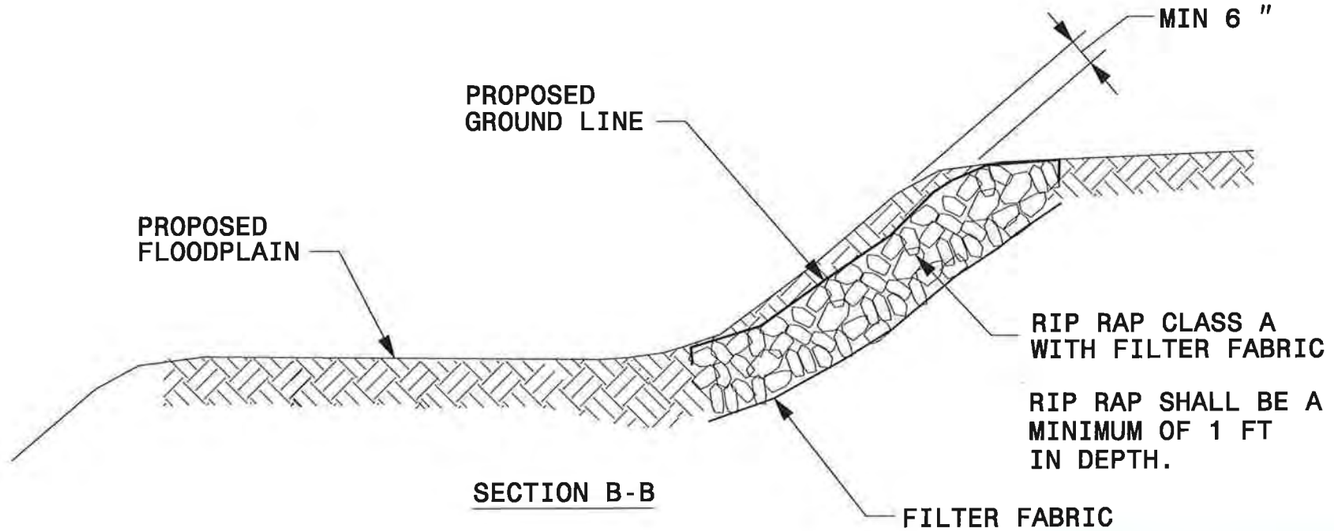
FLOODPLAIN INTERCEPTOR



PLAN VIEW



SECTION A-A



SECTION B-B

RECORD DRAWINGS

NOTE:
FLOODPLAIN INTERCEPTORS SHALL BE PLACED ON-SITE AT AREAS SPECIFIED BY DESIGNER.

SHEET ADDED WHEN OFFSITE WATER ERODED THE BANKS WHEN ENTERING THE FLOODPLAIN

50 0 100
SCALE

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 037826 ENGINEER WYATT D. YELVERTON
8/16/12

UNNAMED TRIBUTARY TO CANE CREEK
HENDERSON COUNTY, NC
SCO PROJECT NO. 040630201A
SHEET 2

HDR Engineering, Inc. of the Carolinas
3733 National Drive, Suite 207 Raleigh, N.C. 27612

Ecosystem Enhancement PROGRAM

REVISIONS

8/16/2012
H:\EEP-WRP\20671 Fletcher\2. Construction\As Builts\Plansheets\Fletcher_asbuilt_details.dgn

PLAN VIEW

CONSTRUCTION EASEMENT ENCOMPASSES ENTIRE TOWN OF FLETCHER PARCEL IN ADDITION TO PORTIONS OF THE ROCKWELL (ARVIN-MERITOR) PARCEL TO THE SOUTHWEST SHOWN ON PLANS

REVISIONS

BEGIN UPPER REACH
STA.10+00.00
LAT: 36.285325
LONG: 83.663483

END ROAD
STA.17+17.04
LAT: 35.418390
LONG: 82.511810

STRUCTURE NOT INSTALLED AT DESINGER REQUEST. POOR SOIL CONDITIONS.

STUCTURE RELOCATED TO STA. 17+20

STUCTURE RELOCATED SLIGHTLY DOWNSTREAM

STUCTURE RELOCATED TO STA. 13+10

STUCTURE RELOCATED TO STA. 16+45

CONSERVATION EASEMENT

SLOPE STAKE BOUNDARY

FUTURE CROSSING

CONSTRUCTION EASEMENT

LOG VANES WITH ROOT WAD

LOG VANE WITH ROOT WAD

FLOOD PLAIN INTECEPTOR

THALWEG

BANKFULL

RIGHT BANK

LEFT BANK

EXISTING 24" NPDES OUTFALL

EXISTING STREAM CENTERLINE

EXISTING DRAINAGE SWALE TO BE FILLED (TYP.)

EXISTING AGRICULTURAL DITCH TO BE FILLED

PROPERTY LINE

UR-1 UR-2 UR-3 UR-4 UR-5 UR-6 UR-7 UR-8 UR-9 UR-10 UR-11 UR-12 UR-13 UR-14 UR-15 UR-16 UR-17

MATCH LINE STA. 22+89.79 SEE SHEET 5

PIN# 9652-45-2928 TOWN OF FLETCHER DB 1056, PG 702

PIN#9625-55-3657 SIROCCO PROPERTIES LLC DB 1129, PG 485

NOTES:

1. WOOD PILES WERE ADDED FOR WILDLIFE HABITAT.
2. FLOODPLAIN INTERCEPTORS ADDED TO PROTECT AGAINST EROSION IN AREAS OF OFF-SITE CONCENTRATED FLOW.

LEGEND

- ROCK CROSS VANE
- LOG CROSS VANE
- LOG VANE W/ ROOT WAD AND SILL
- LOG VANE W/ ROOT WAD
- CONSTRUCTION EASEMENT
- FLOODPLAIN INTERCEPTOR
- NEW LOG VANE WITH ROOT WAD
- NEW BRUSH MATTRESS
- NEW BOULDERS
- LEFT AND RIGHT BANKULL
- FILL EXISTING CHANNEL
- CHANNEL PLUG
- BRUSH MATTRESS
- PROPOSED WETLAND BOUNDARY
- WETLAND
- CONSERVATION EASEMENT
- PARCEL LINE
- EXISTING CONCRETE MONUMENT
- EXISTING IRON BAR AND CAP
- TEMPORARY BENCH MARK
- CROSS SECTION CONTROL
- DECIDOUS TREE

50 0 100
SCALE

RECORD DRAWINGS

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 037526 ENGINEER WYATT D. YELVERTON
8/16/12

UNNAMED TRIBUTARY TO CANE CREEK
HENDERSON COUNTY, NC
SCO PROJECT NO. 040630201A

SHEET 4

HDR Engineering, Inc. of the Carolinas
3733 National Drive, Suite 207 Raleigh, N.C. 27612

Ecosystem Enhancement PROGRAM

8/16/2012
R:\EEP-WRP\20671 Fletcher\2. Construction\As Builts\Plansheets\Fletcher_asbuilt_record_drawing_PSH4.dgn

REVISIONS

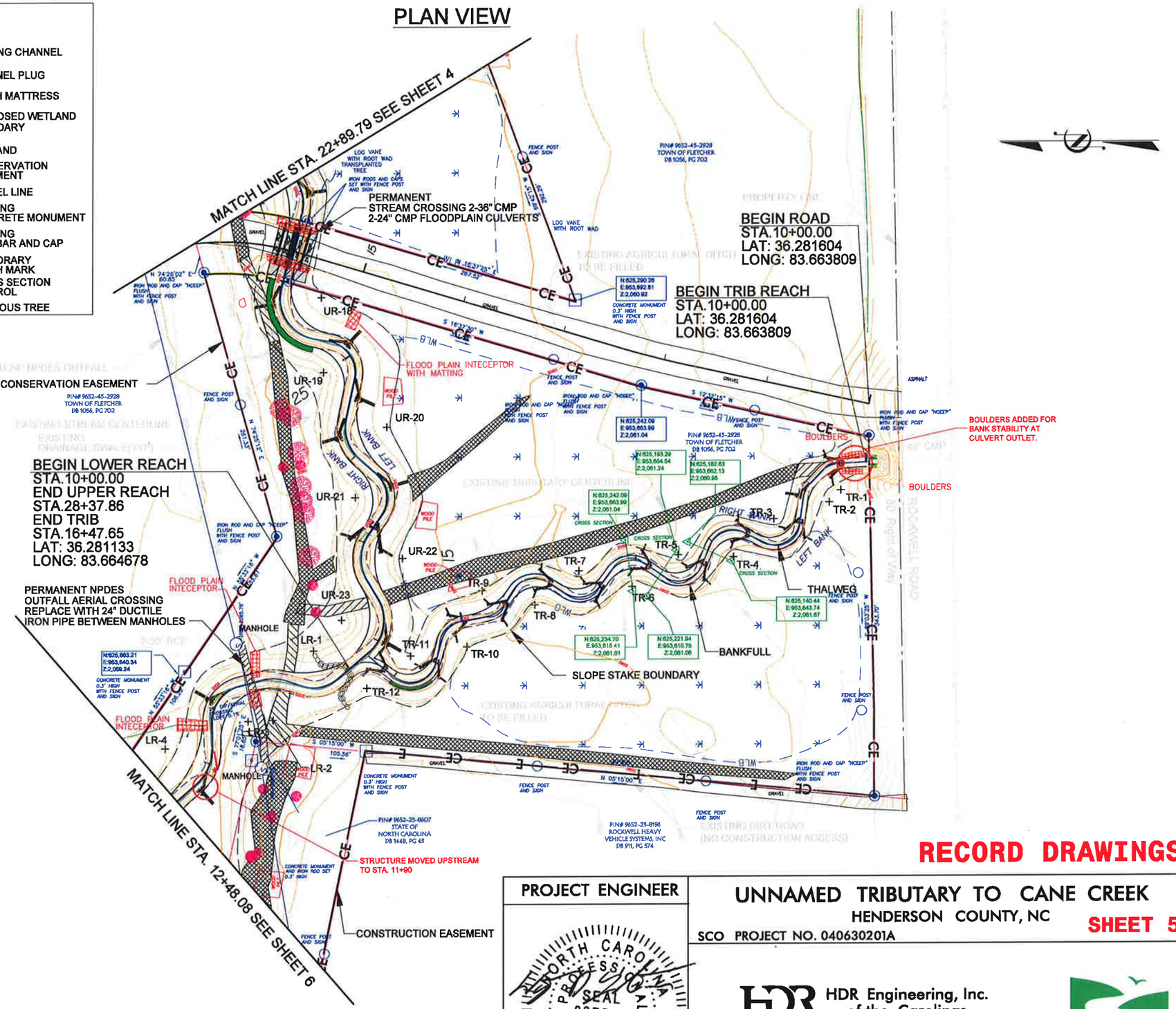
LEGEND

- ROCK CROSS VANE
- LOG CROSS VANE
- LOG VANE W/ ROOT WAD AND SILL
- LOG VANE W/ ROOT WAD
- E — CONSTRUCTION EASEMENT
- FLOODPLAIN INTERCEPTOR
- NEW LOG VANE WITH ROOT WAD
- NEW BRUSH MATTRESS
- NEW BOULDERS
- LEFT AND RIGHT BANKULL
- FILL EXISTING CHANNEL
- CHANNEL PLUG
- BRUSH MATTRESS
- WLB — PROPOSED WETLAND BOUNDARY
- WETLAND
- CE — CONSERVATION EASEMENT
- PL — PARCEL LINE
- EXISTING CONCRETE MONUMENT
- EXISTING IRON BAR AND CAP
- TEMPORARY BENCH MARK
- CROSS SECTION CONTROL
- DECIDUOUS TREE

NOTES:

1. WOOD PILES WERE ADDED FOR WILDLIFE HABITAT.
2. FLOODPLAIN INTERCEPTORS ADDED TO PROTECT AGAINST EROSION IN AREAS OF OFF-SITE CONCENTRATED FLOW.

PLAN VIEW



RECORD DRAWINGS

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 037526 ENGINEER WYATT D. YELVERTON 8/16/12

UNNAMED TRIBUTARY TO CANE CREEK
HENDERSON COUNTY, NC
SCO PROJECT NO. 040630201A

SHEET 5

HDR Engineering, Inc. of the Carolinas
3733 National Drive, Suite 207 Raleigh, N.C. 27612

Ecosystem Enhancement PROGRAM

8/16/2012
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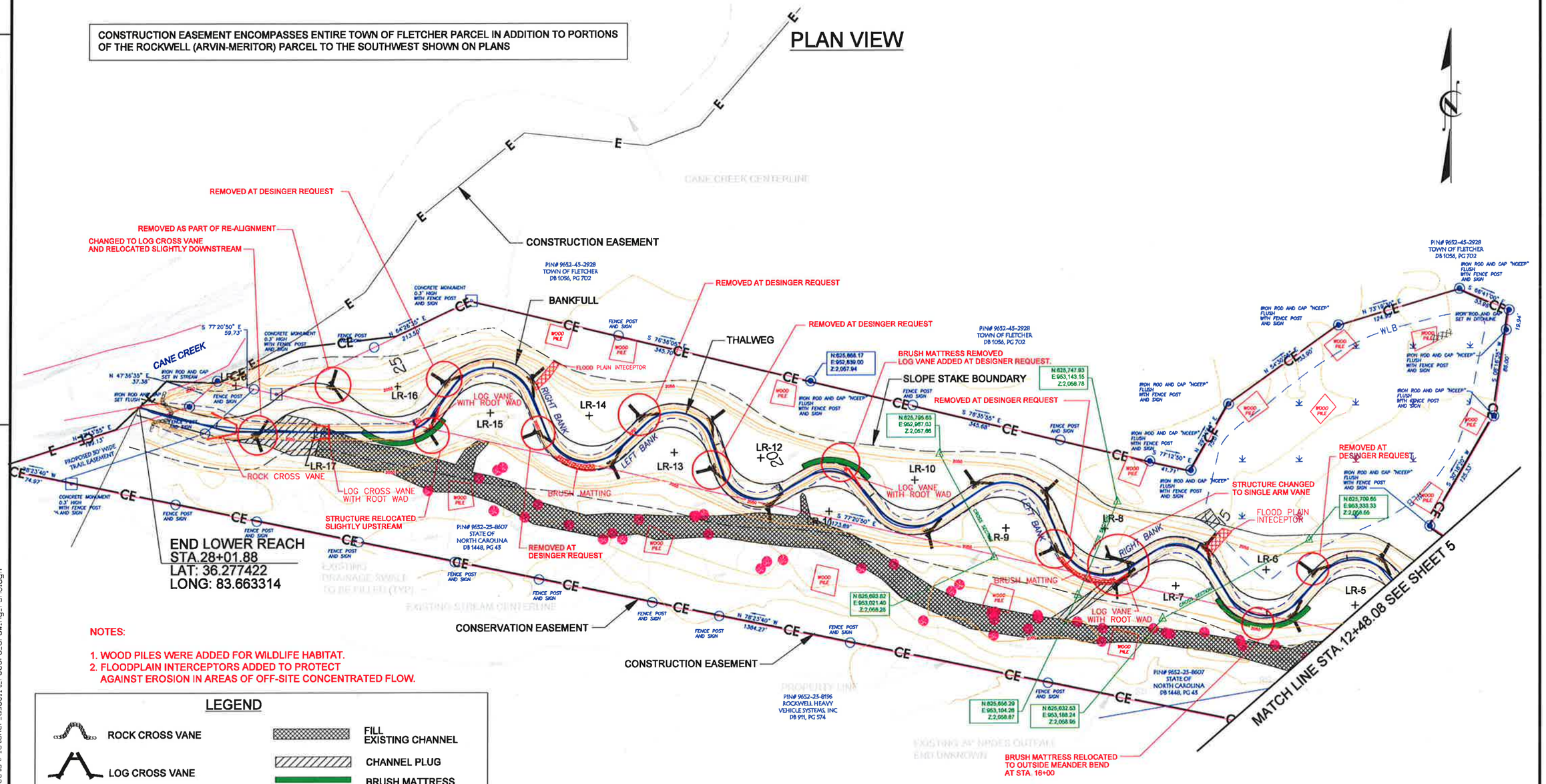
REVISIONS

CONSTRUCTION EASEMENT ENCOMPASSES ENTIRE TOWN OF FLETCHER PARCEL IN ADDITION TO PORTIONS OF THE ROCKWELL (ARVIN-MERITOR) PARCEL TO THE SOUTHWEST SHOWN ON PLANS

PLAN VIEW



NOTES:

1. WOOD PILES WERE ADDED FOR WILDLIFE HABITAT.
2. FLOODPLAIN INTERCEPTORS ADDED TO PROTECT AGAINST EROSION IN AREAS OF OFF-SITE CONCENTRATED FLOW.

LEGEND

- ROCK CROSS VANE
- LOG CROSS VANE
- LOG VANE W/ ROOT WAD AND SILL
- LOG VANE W/ ROOT WAD
- CONSTRUCTION EASEMENT
- FLOODPLAIN INTERCEPTOR
- NEW LOG VANE WITH ROOT WAD
- NEW BRUSH MATTRESS
- NEW BOULDERS
- NEW ROCK CROSS VANE WITH ROOT WAD
- LEFT AND RIGHT BANKULL
- FILL EXISTING CHANNEL
- CHANNEL PLUG
- BRUSH MATTRESS
- PROPOSED WETLAND BOUNDARY
- WETLAND
- CONSERVATION EASEMENT
- PARCEL LINE
- EXISTING CONCRETE MONUMENT
- EXISTING IRON BAR AND CAP
- TEMPORARY BENCH MARK
- CROSS SECTION CONTROL
- DECIDOUS TREE

50 0 100
SCALE

RECORD DRAWINGS

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 037526 ENGINEER WYATT D. YELVERTON
8/16/12

UNNAMED TRIBUTARY TO CANE CREEK
HENDERSON COUNTY, NC
SCO PROJECT NO. 040630201A

SHEET 6

HDR Engineering, Inc. of the Carolinas
3733 National Drive, Suite 207 Raleigh, N.C. 27612

Ecosystem Enhancement PROGRAM

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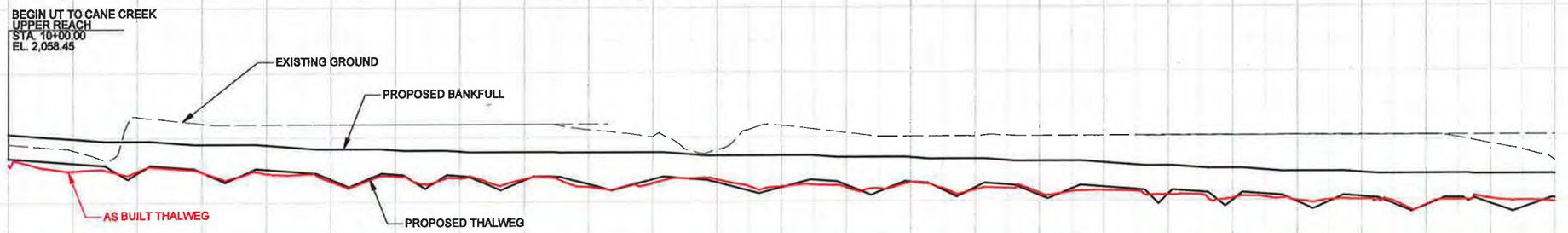
5/28/99

UPPER REACH



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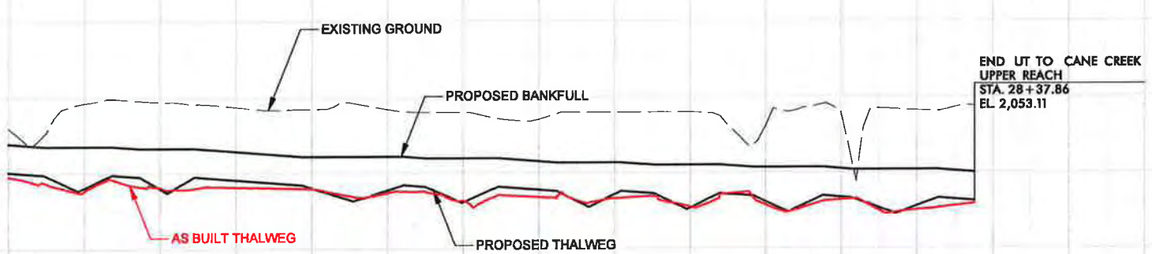
2,055
2,050
2,045

10 11 12 13 14 15 16 17 18 19 20 21 22

UPPER REACH



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22 23 24 25 26 27 28

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 037526 ENGINEER WYATT D. YELVERTON

8/16/12

RECORD DRAWINGS

UNNAMED TRIBUTARY TO CANE CREEK
HENDERSON COUNTY, NC

SCO PROJECT NO. 040630201

SHEET 7

Ecosystem Enhancement Program

HDR Engineering, Inc. of the Carolinas
3723 National Drive, Suite 267 Raleigh, N.C. 27612

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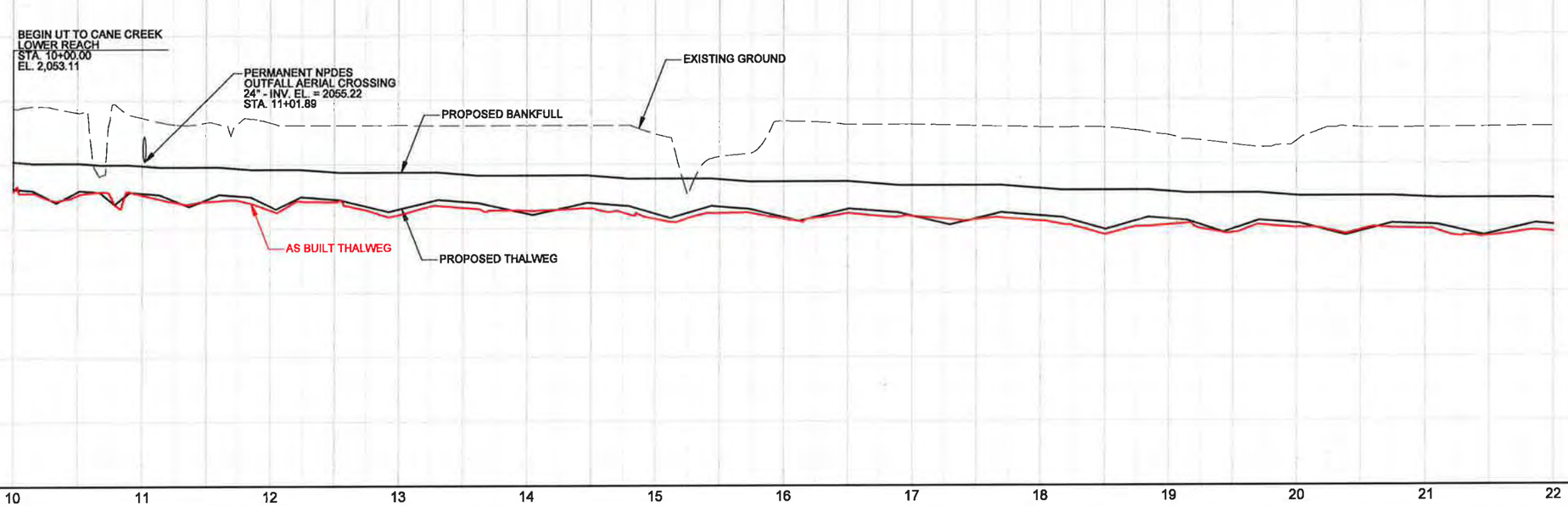
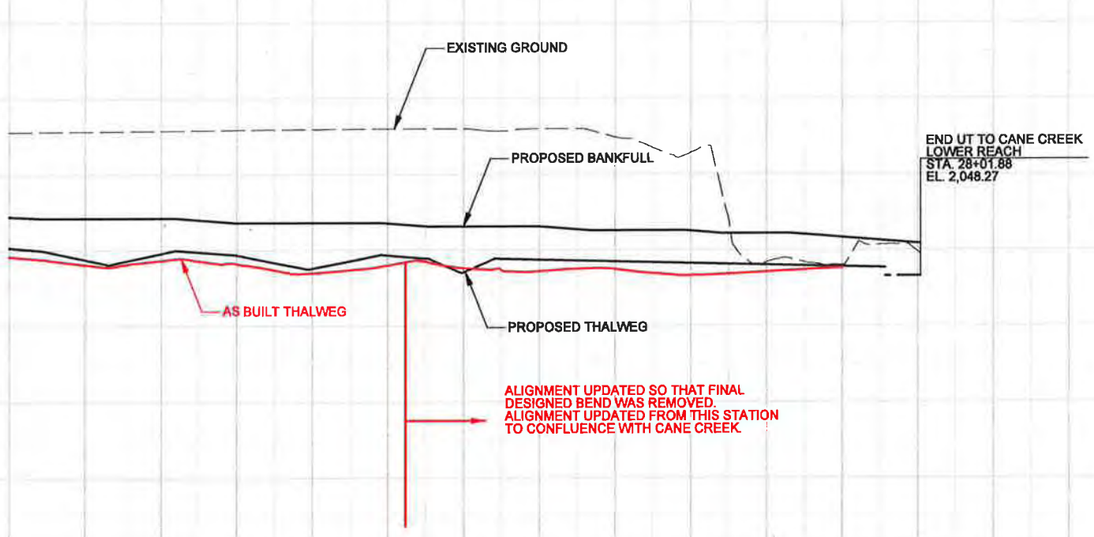
LOWER REACH



LOWER REACH



PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 037526 ENGINEER WATT D. YELVERTON

8/16/12

RECORD DRAWINGS

UNNAMED TRIBUTARY TO CANE CREEK
HENDERSON COUNTY, NC

SCO PROJECT NO. 040630201

SHEET 8

Ecosystem Enhancement

HDR Engineering, Inc. of the Carolinas
3733 National Drive, Suite 207 Raleigh, N.C. 27612

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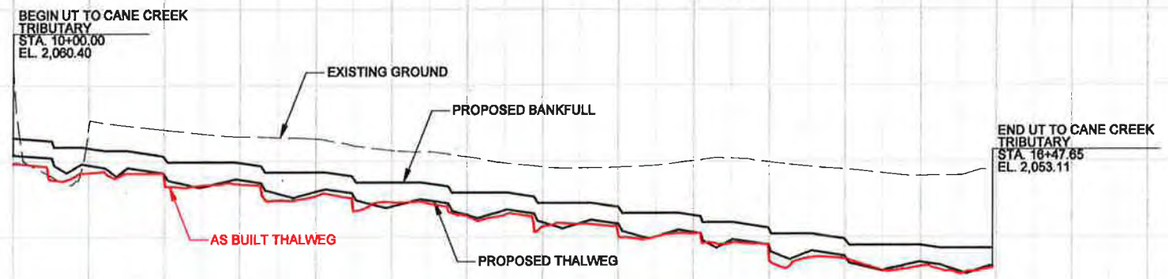
TRIBUTARY



2,065
2,060
2,055
2,050
2,045

10 11 12 13 14 15 16 17

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 037526 ENGINEER WYATT D. YELVERTON

8/16/12

RECORD DRAWINGS

UNNAMED TRIBUTARY TO CANE CREEK
HENDERSON COUNTY, NC

SCO PROJECT NO. 040630201

SHEET 9

Ecosystem Enhancement

HDR Engineering, Inc. of the Carolinas
3733 National Drive, Suite 207 Raleigh, N.C. 27612

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8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-3826	10

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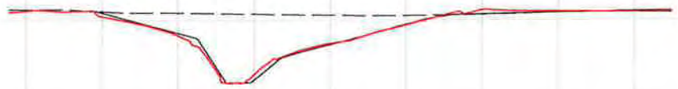
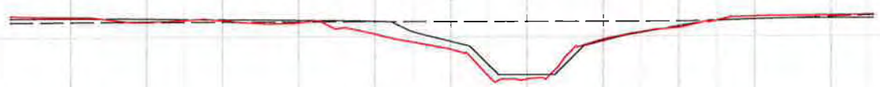
2065
2060
2055

15+23
RIFFLE



14+49
POOL LEFT



12+02
RIFFLE

–UPPER REACH–

RECORD DRAWINGS

8/16/2012
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8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
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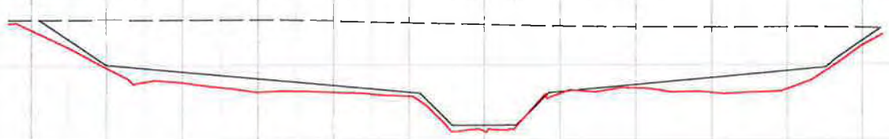
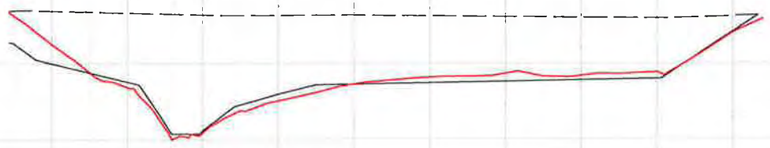
2060
2055
2050



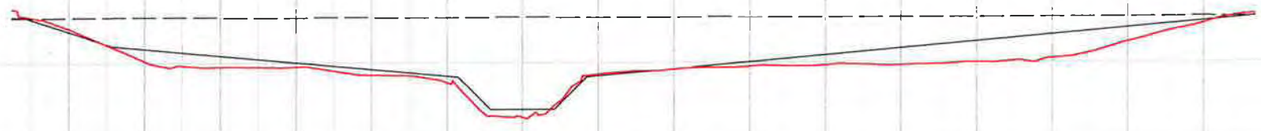
17+89
RIFFLE

2060
2055
2050



16+15
POOL LEFT

2060
2055
2050



14+55
RIFFLE

–LOWER REACH–

100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100

RECORD DRAWINGS

8/16/2012
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cmiers

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-3826	12

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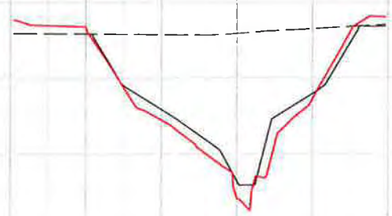
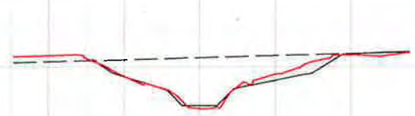
2065
2060
2055



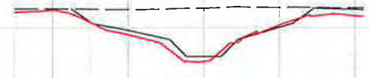
13+07
POOL RIGHT

2065
2060
2055



12+72
RIFFLE

2065
2060
2055



12+10
RIFFLE

–TRIBUTARY+

RECORD DRAWINGS

100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100

8/16/2012
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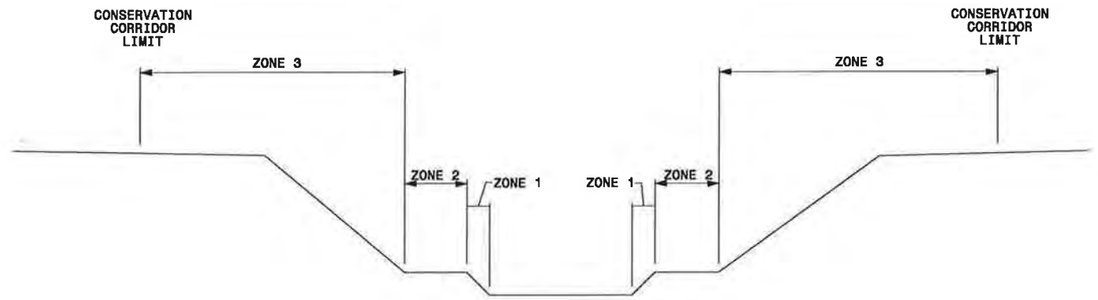
dmiers

PLANTING DETAILS



ZONE 1

LIVE STAKES

	Species Name	Common Name
Not Used	~~Cephalanthus occidentalis~~	~~Button bush~~
	Cornus amomum	Silky dogwood
	Salix higra	Black willow
	Physocarpus opulifolius	Ninebark
	Salix sericea	Silky willow
	Sambucus canadensis	Elderberry
Not Used	~~Symphoricarpos orbiculatus~~	~~Coral-berry~~

A minimum of 4 out of the 7 species to be installed approx. 3′ on center (4840 stakes/acre)

TEMPORARY SEEDING

Species Name	Common Name
Secale cereale	Rye grain (for cool season)

Applied at a rate of 50lbs per acre

PERMANENT SEED MIX

Species Name	Common Name
~~Andropogon gerardii~~	~~Big bluestem~~
~~Panicum clandestinum~~	~~Deertongue~~
~~Chasmanthium latifolium~~	~~River oats~~
~~Elymus virginicus~~	~~Virginia wildrye~~
~~Tripsacum dactyloides~~	~~Eastern gama grass~~
~~Eragrostis spectabilis~~	~~Purple love grass~~

A minimum of 4 out of the 6 species applied at 40 lbs/acre from April 1st to July 1st

ACTUAL PERMANENT SEED MIX
(As agreed upon and recorded in Weekly Report 8, dated Jan. 25, 2012)

Species Name	Common Name
Panicum virgatum	Switchgrass
Juncus effusus	Soft Rush
Scirpus cyperinus	Woolgrass
Carex Lupulina	Hop Sedge
Pancium clandestinum	Deertongue
Tripsacum dactyloides	Gamagrass
Vernonia noveboracensis	Ironweed

50 0 100

SCALE

ZONE 2

CONTAINERIZED/PLUG

	Species Name	Common Name
	Alnus serrulata	Tag alder
	Asimina triloba	Pawpaw
	Callicarpa americana	Beautyberry
	Calycanthus floridus	Sweet-shrub
	Cephalanthus occidentalis	Button bush
	Itea virginica	Virginia willow
	Lindera benzoin	Spicebush
	Sambucus canadensis	Elderberry
	Symphoricarpos orbiculatus	Coral-berry
Added	Betula nigra	River birch

A minimum of 5 out of the 10 species to be installed approx. 15′ on center. 30-40% container, the remainder to be plugs.

BARE ROOT

	Species Name	Common Name
	Cornus amomum	Silky dogwood
Not Used	~~Almus serrulata~~	~~Tag alder~~
	Acer rubrum	Red maple
	Betula nigra	River birch
Not Used	~~Celtis laevigata~~	~~Sugarberry~~
	Fraxinus pennsylvanica	Green Ash
Not Used	~~Nyssa sylvatica~~	~~Black gum~~
	Platanus occidentalis	Sycamore
Not Used	~~Quercus nigra~~	~~Water oak~~
	Quercus phellos	Willow oak

A minimum of 6 out of the 10 species to be installed approx. 8′ on center (680 bare roots/acre)

ZONE 3

BARE ROOT

	Species Name	Common Name
	Acer rubrum	Red maple
	Betula nigra	River birch
Not Used	~~Celtis laevigata~~	~~Sugarberry~~
	Fraxinus pennsylvanica	Green Ash
Not Used	~~Nyssa sylvatica~~	~~Black gum~~
	Platanus occidentalis	Sycamore
Not Used	~~Quercus nigra~~	~~Water oak~~
	Quercus phellos	Willow oak
	Diospyros virginiana	Persimmon
	Juglans nigra	Black walnut

A minimum of 6 out of the 10 species to be installed approx. 8′ on center (680 bare roots/acre)

RECORD DRAWINGS

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 037526 ENGINEER WYATT D. YELVERTON

8/16/12

UNNAMED TRIBUTARY TO CANE CREEK
HENDERSON COUNTY, NC

SCO PROJECT NO. 040630201A

SHEET 13

HDR Engineering, Inc. of the Carolinas
3733 National Drive, Suite 207 Raleigh, N.C. 27612

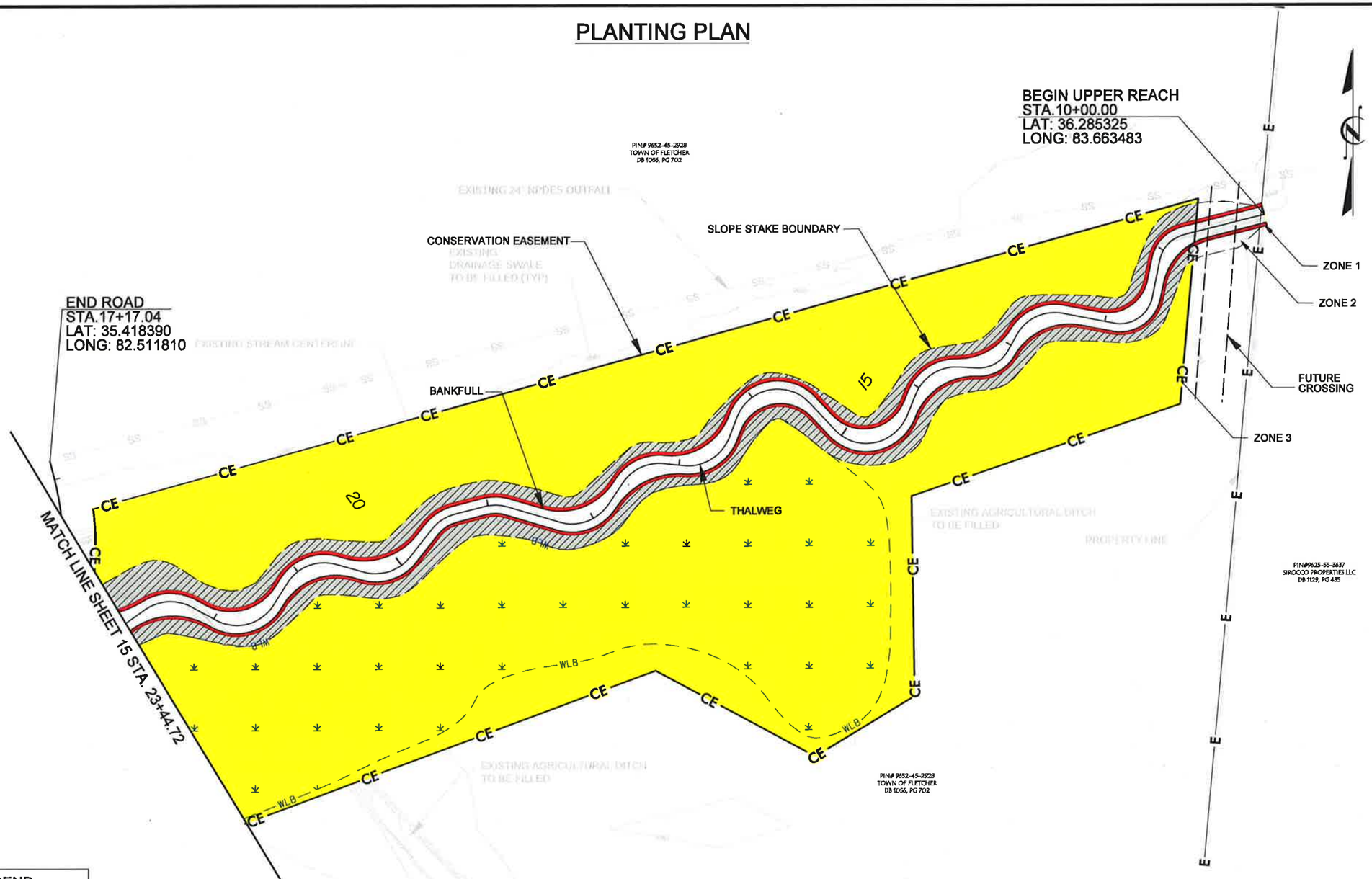
Ecosystem Enhancement PROGRAM

REVISIONS

8/16/2012 M:\RP\20671 Fletcher\2. Construction\As Builts\Plansheets\Planting\Fletcher-plant.details.dgn

PLANTING PLAN

REVISIONS



LEGEND

- ZONE 1
- ZONE 2
- ZONE 3

NOTE:

Permanent seeding in disturbed areas outside of the Conservation Easement
are to follow the NCDOT Erosion and Sedimentation Control Special Provision for Seeding and Mulching Native Grass-Bluegrass

50 0 100
SCALE

RECORD DRAWINGS

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 037526 ENGINEER WYATT D. YELVERTON 8/16/17

UNNAMED TRIBUTARY TO CANE CREEK
HENDERSON COUNTY, NC
SCO PROJECT NO. 040630201A

SHEET 14

HDR Engineering, Inc. of the Carolinas
3733 National Drive, Suite 207 Raleigh, N.C. 27612

Ecosystem Enhancement PROGRAM

8/16/2017
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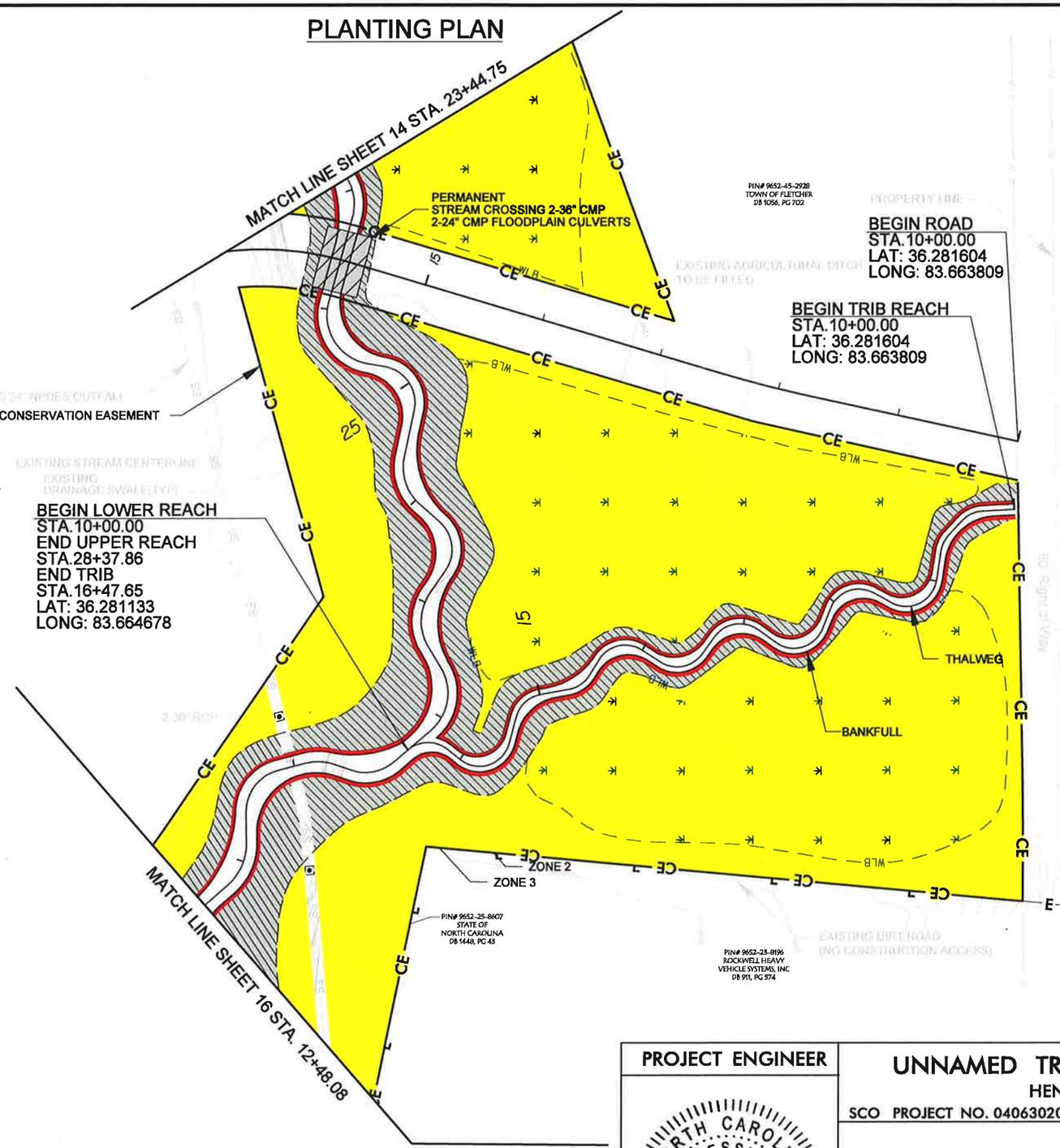
PLANTING PLAN



REVISIONS

RECORD DRAWINGS

LEGEND

- ZONE 1
- ZONE 2
- ZONE 3

NOTE:

Permanent seeding in disturbed areas outside of the Conservation Easement
are to follow the NCDOT Erosion and Sedimentation Control Special Provision for Seeding and Mulching Native Grass-Bluegrass

50 0 100
SCALE

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 037526 ENGINEER WYATT D. YELVERTON 8/16/12

UNNAMED TRIBUTARY TO CANE CREEK
HENDERSON COUNTY, NC
SCO PROJECT NO. 040630201A

SHEET 15

HDR Engineering, Inc. of the Carolinas
3733 National Drive, Suite 207 Raleigh, N.C. 27612

Ecosystem Enhancement PROGRAM

8/16/2012
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PLANTING PLAN

REVISIONS

ALINGMENT CHANGE AS NOTED ON SHEET 6.
PLANTING LOCATIONS WERE UPDATED ACCORDINGLY.

CANE CREEK CENTERLINE

PIN# 9652-45-2928
TOWN OF FLETCHER
DB 1056, PG 702

BANKFULL

THALWEG

SLOPE STAKE BOUNDARY

ZONE 1

Z2

Z3

WLB

END LOWER REACH
STA.28+01.88
LAT: 36.277422
LONG: 83.663314

CONSERVATION EASEMENT

EXISTING DRAINAGE SWALE TO BE FILLED (TYP.)

EXISTING STREAM CENTERLINE

PIN# 9652-25-8607
STATE OF
NORTH CAROLINA
DB 1448, PG 45

PROPERTY LINE

PIN# 9652-25-8196
ROCKWELL HEAVY
VEHICLE SYSTEMS, INC
DB 911, PG 574

EXISTING 24" RCP DES OUTFALL END UNKNOWN

MATCH LINE SHEET 15 STA.12+48.08

LEGEND

- ZONE 1
- ZONE 2
- ZONE 3

NOTE:

Permanent seeding in disturbed areas outside of the Conservation Easement
are to follow the NCDOT Erosion and Sedimentation Control Special Provision for Seeding and Mulching Native Grass-Bluegrass

50 0 100
SCALE

RECORD DRAWINGS

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 037526 ENGINEER WATT D. YELVERTON
8/16/12

UNNAMED TRIBUTARY TO CANE CREEK
HENDERSON COUNTY, NC
SCO PROJECT NO. 040630201A

SHEET 16

HDR Engineering, Inc. of the Carolinas
3733 National Drive, Suite 207 Raleigh, N.C. 27612

Ecosystem Enhancement PROGRAM

8/16/2012
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GENERAL NOTES:

1) THIS PROPERTY IS SUBJECT TO ANY EASEMENTS (WRITTEN OR UNWRITTEN)
2) THIS PROPERTY WAS SURVEYED WITHOUT THE BENEFIT OF A TITLE SEARCH AND THEREFORE MAY NOT SHOW ALL ENCUMBRANCES
3) ALL CORNERS ARE MARKED AS SHOWN IN THE LEGEND UNLESS OTHERWISE NOTED
4) DEED REFERENCES WERE RESEARCHED IN THE HENDERSON COUNTY REGISTRY OF DEEDS
5) AREAS SHOWN HEREON WAS COMPUTED BY THE COORDINATE METHOD
6) THE SUBJECT PARCEL CAN BE IDENTIFIED AS SHOWN HEREON
7) ALL BEARINGS ARE BASED ON NCGS MONUMENT "CRANSTON" AND ARE SUBJECT TO THE ACCURACY THEREOF. RECORD LOCATION PER NATIONAL GEODETIC SURVEY;

NORTH CAROLINA STATE PLANE NAD 83 (NSRS 2007)
NORTHING; 625,708.17 FEET
EASTING; 955,903.82 FEET
SCALE FACTOR=0.99987681
CONVERGENCE= -2° 01' 23.2"

7) ALL ELEVATIONS ARE BASED ON NCGS MONUMENT "CRANSTON AZ MARK" AND ARE SUBJECT TO THE ACCURACY THEREOF. RECORD LOCATION PER NATIONAL GEODETIC SURVEY;

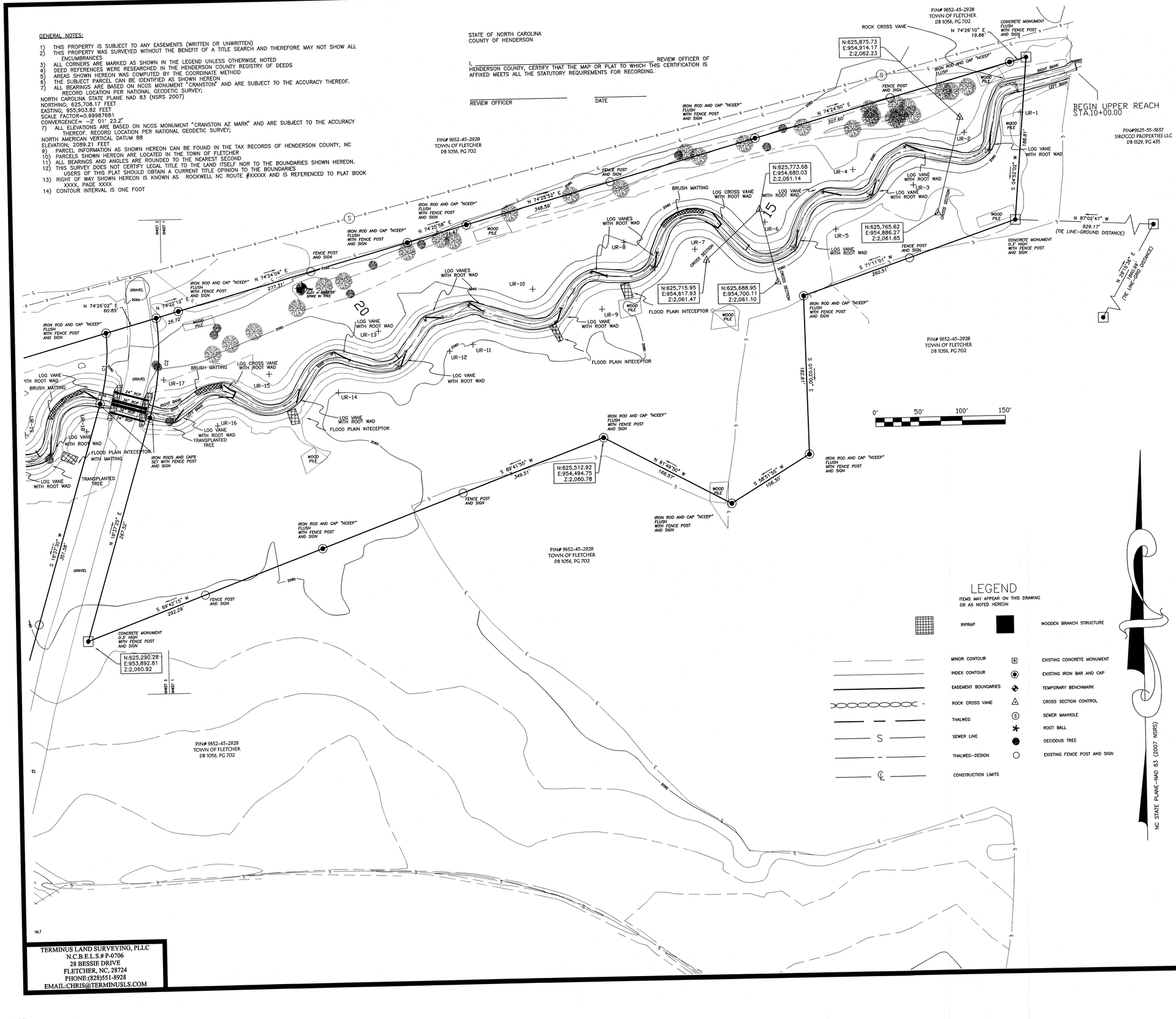
NORTH AMERICAN VERTICAL DATUM 88
ELEVATION; 2089.21 FEET

9) PARCEL INFORMATION AS SHOWN HEREON CAN BE FOUND IN THE TAX RECORDS OF HENDERSON COUNTY, NC
10) PARCELS SHOWN HEREON ARE LOCATED IN THE TOWN OF FLETCHER
11) ALL BEARINGS AND ANGLES ARE ROUNDED TO THE NEAREST SECOND
12) THIS SURVEY DOES NOT CERTIFY LEGAL TITLE TO THE LAND ITSELF NOR TO THE BOUNDARIES SHOWN HEREON. USERS OF THIS PLAT SHOULD OBTAIN A CURRENT TITLE OPINION TO THE BOUNDARIES
13) RIGHT OF WAY SHOWN HEREON IS KNOWN AS ROCKWELL NC ROUTE #XXXXX AND IS REFERENCED TO PLAT BOOK XXXX, PAGE XXXX
14) CONTOUR INTERVAL IS ONE FOOT

STATE OF NORTH CAROLINA
COUNTY OF HENDERSON

I, _____ REVIEW OFFICER OF HENDERSON COUNTY, CERTIFY THAT THE MAP OR PLAT TO WHICH THIS CERTIFICATION IS AFFIXED MEETS ALL THE STATUTORY REQUIREMENTS FOR RECORDING.

REVIEW OFFICER _____ DATE _____

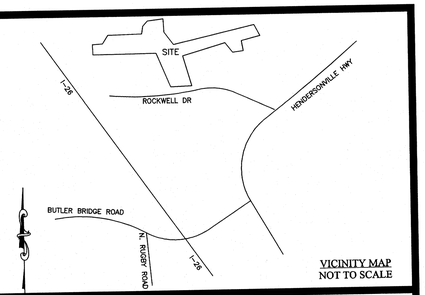


LEGEND

ITEMS MAY APPEAR ON THIS DRAWING OR AS NOTED HEREON

- RIPRAP
- WOODEN BRANCH STRUCTURE
- MINOR CONTOUR
- INDEX CONTOUR
- EASEMENT BOUNDARIES
- ROCK CROSS VANE
- THALWEG
- SEWER LINE
- THALWEG-DESIGN
- CONSTRUCTION LIMITS
- EXISTING CONCRETE MONUMENT
- EXISTING IRON BAR AND CAP
- TEMPORARY BENCHMARK
- CROSS SECTION CONTROL
- SEWER MANHOLE
- ROOT BALL
- DECIDOUS TREE
- EXISTING FENCE POST AND SIGN

NC STATE PLANE-NAD 83 (2007 NSRS)



VICINITY MAP
NOT TO SCALE

STATE OF NORTH CAROLINA
COUNTY OF HENDERSON

I, CHRISTOPHER JAMES GAGNE, CERTIFY THAT THIS PLAT WAS DRAWN UNDER MU SUPERVISION FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION (DEED DESCRIPTION RECORDED SHOWN HEREON); THAT THE BOUNDARIES NOT SURVEYED ARE CLEARLY INDICATED AS DRAWN FROM INFORMATION FOUND IN DEED BOOK XXXX, PAGE XXXX; THAT IN ACCORDANCE WITH G.S. 47-30 AS AMENDED. MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 14TH DAY OF JUNE, 2012.

I ALSO CERTIFY THAT THIS SURVEY IS OF THE FOLLOWING CATEGORIES AS DESCRIBED IN G.S. 47-30

A) THAT THE SURVEY CREATES A SUBDIVISION OF LAND WITHIN THE AREA OF A COUNTY OR MUNICIPALITY THAT HAS AN ORDINANCE THAT REGULATES PARCELS OF LAND;
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E) THAT THE INFORMATION AVAILABLE TO THE SURVEYOR IS SUCH THAT THE SURVEYOR IS UNABLE TO MAKE A DETERMINATION TO THE BEST OF THE SURVEYOR'S PROFESSIONAL ABILITY AS TO PROVISIONS CONTAINED IN (A) THROUGH (D) ABOVE.

NORTH CAROLINA PROFESSIONAL SEAL L-4700 LAND SURVEYOR CHRISTOPHER JAMES GAGNE

Clifton Sara Gagne P.L.S.

CHRISTOPHER JAMES GAGNE P.L.S. L-4700

STATE OF NORTH CAROLINA
COUNTY OF HENDERSON

FILED FOR REGISTRATION ON THE _____
DAY OF _____, 2012,
AT _____ AND RECORDED IN
PLAT BOOK _____, PAGE _____.

BY: _____
REGISTER OF DEEDS

BY: _____
DEPUTY/ASSISTANT

DRAWING DATE; JUNE 12, 2012

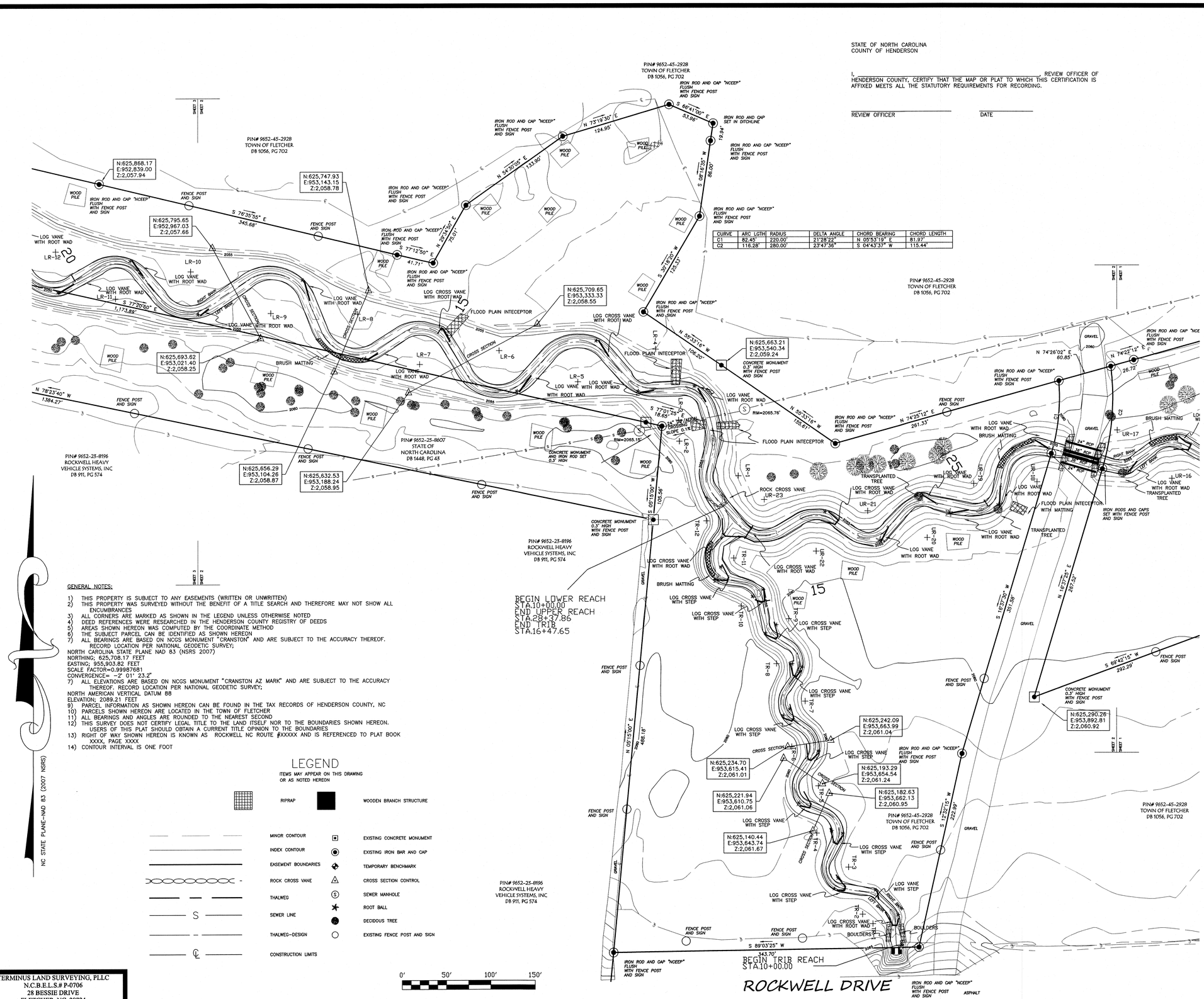
SCALE: 1"=50'	SHEET NO. 1 OF 3	
DRAWN BY: CJG	DRAWING NAME: S042BW01.DWG	PROJECT NO.: S-042B
FIELD WORK: 12/2010-5/2012		

REV.	DESCRIPTION	DATE

ASBUILT SURVEY FOR
STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM
FLETCHER-MERITOR STREAM RESTORATION
SCO PROJECT#: 040630201

TOWN OF FLETCHER, HENDERSON COUNTY, NORTH CAROLINA

TERMINUS LAND SURVEYING, PLLC
N.C.B.E.L.S.# P-0706
28 BESSIE DRIVE
FLETCHER, NC, 28724
PHONE:(828)551-8928
EMAIL:CHRIS@TERMINUSLS.COM



CURVE	ARC LGTH	RADIUS	DELTA ANGLE	CHORD BEARING	CHORD LENGTH
C1	82.45'	220.00'	21°28'22"	N 05°53'19" E	81.97'
C2	116.28'	280.00'	23°47'36"	S 04°43'37" W	115.44'

GENERAL NOTES:

1) THIS PROPERTY IS SUBJECT TO ANY EASEMENTS (WRITTEN OR UNWRITTEN)
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3) ALL CORNERS ARE MARKED AS SHOWN IN THE LEGEND UNLESS OTHERWISE NOTED
4) DEED REFERENCES WERE RESEARCHED IN THE HENDERSON COUNTY REGISTRY OF DEEDS
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6) THE SUBJECT PARCEL CAN BE IDENTIFIED AS SHOWN HEREON
7) ALL BEARINGS ARE BASED ON NCGS MONUMENT "CRANSTON" AND ARE SUBJECT TO THE ACCURACY THEREOF. RECORD LOCATION PER NATIONAL GEODETIC SURVEY;
NORTH CAROLINA STATE PLANE NAD 83 (NSRS 2007)
NORTHING; 625,708.17 FEET
EASTING; 955,903.82 FEET
SCALE FACTOR=0.9998768
CONVERGENCE= -2° 01' 23.2"
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NORTH AMERICAN VERTICAL DATUM 88
ELEVATION; 2089.21 FEET
9) PARCEL INFORMATION AS SHOWN HEREON CAN BE FOUND IN THE TAX RECORDS OF HENDERSON COUNTY, NC
10) PARCELS SHOWN HEREON ARE LOCATED IN THE TOWN OF FLETCHER
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14) CONTOUR INTERVAL IS ONE FOOT

NC STATE PLANE-NAD 83 (2007 NSRS)

LEGEND

ITEMS MAY APPEAR ON THIS DRAWING OR AS NOTED HEREON

- RIPRAP
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- MINOR CONTOUR
- INDEX CONTOUR
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- ROCK CROSS VANE
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- TEMPORARY BENCHMARK
- CROSS SECTION CONTROL
- SEWER MANHOLE
- ROOT BALL
- DECIDUOUS TREE
- EXISTING FENCE POST AND SIGN

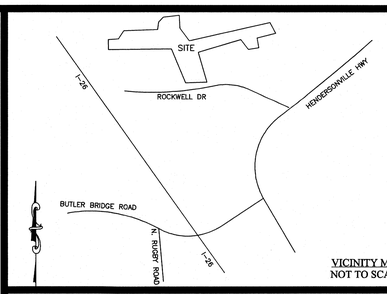
0′ 50′ 100′ 150′

TERMINUS LAND SURVEYING, PLLC
N.C.B.E.L.S.# P-0706
28 BESSIE DRIVE
FLETCHER, NC, 28724
PHONE:(828)551-8928
EMAIL:CHRIS@TERMINUSLS.COM

STATE OF NORTH CAROLINA
COUNTY OF HENDERSON

I, _____, REVIEW OFFICER OF HENDERSON COUNTY, CERTIFY THAT THE MAP OR PLAT TO WHICH THIS CERTIFICATION IS AFFIXED MEETS ALL THE STATUTORY REQUIREMENTS FOR RECORDING.

REVIEW OFFICER _____ DATE _____



VICINITY MAP
NOT TO SCALE

STATE OF NORTH CAROLINA
COUNTY OF HENDERSON

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NORTH CAROLINA PROFESSIONAL SEAL L-4700 LAND SURVEYOR CHRISTOPHER JAMES GAGNE

CHRISTOPHER JAMES GAGNE P.L.S. L-4700

STATE OF NORTH CAROLINA
COUNTY OF HENDERSON

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DAY OF _____, 2012,
AT _____ AND RECORDED IN
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BY: _____
REGISTER OF DEEDS

BY: _____
DEPUTY/ASSISTANT

DRAWING DATE; JUNE 12, 2012

SCALE: 1"=50'	SHEET NO. 2 OF 3		
DRAWN BY: CJG	DRAWING NAME: S042BW01.DWG	PROJECT NO.: S-042B	FIELD WORK: 12/2010-5/2012

REV.	DESCRIPTION	DATE

ASBUILT SURVEY FOR
STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM
FLETCHER-MERITOR STREAM RESTORATION
SCO PROJECT#: 040630201

TOWN OF FLETCHER, HENDERSON COUNTY, NORTH CAROLINA

STATE OF NORTH CAROLINA
COUNTY OF HENDERSON

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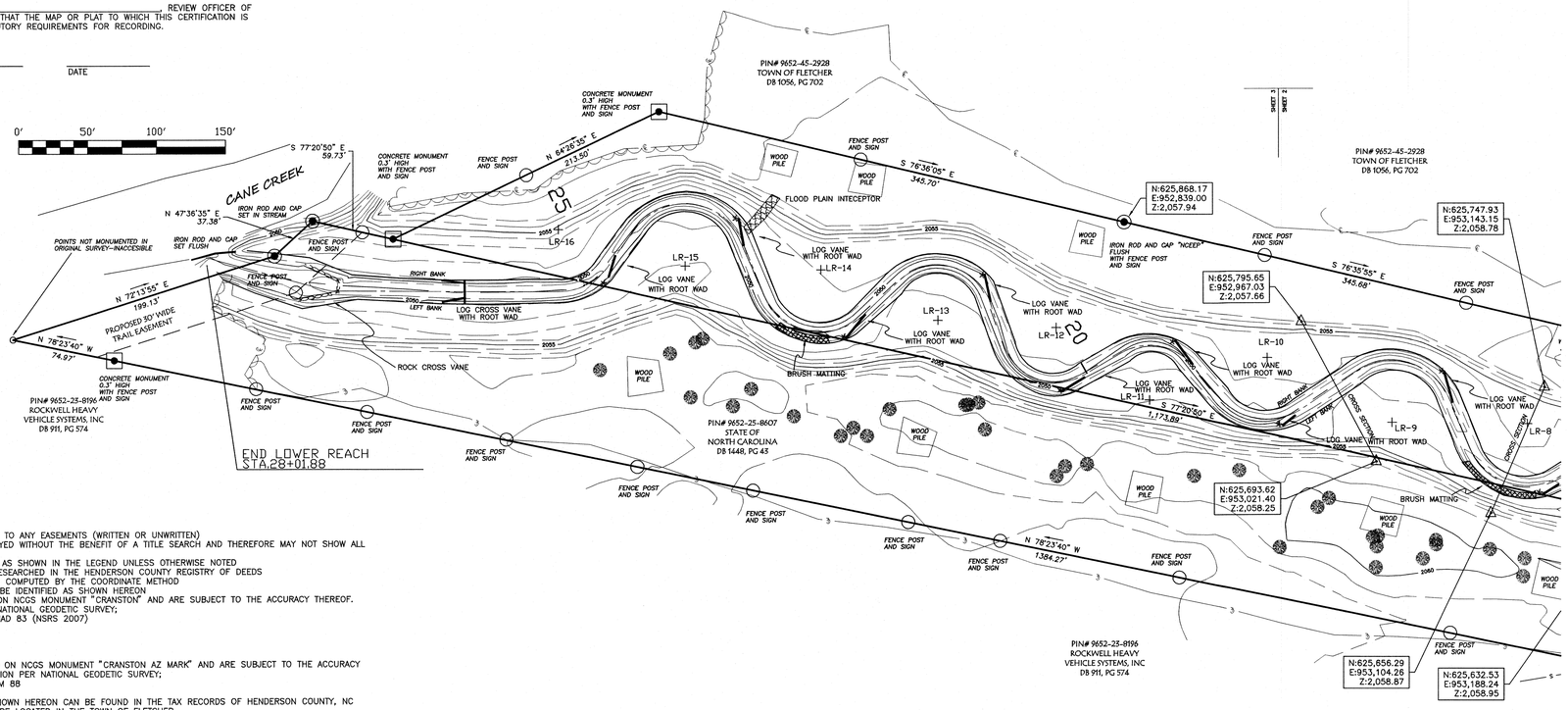

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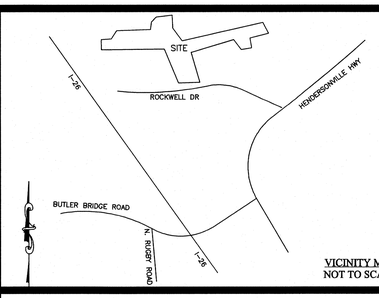

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NORTH CAROLINA PROFESSIONAL SEAL L-4700 LAND SURVEYOR CHRISTOPHER JAMES GAGNE

Christopher James Gagne P.L.S.

CHRISTOPHER JAMES GAGNE P.L.S. L-4700

STATE OF NORTH CAROLINA
COUNTY OF HENDERSON

FILED FOR REGISTRATION ON THE _____

DAY OF _____, 2012,

AT _____ AND RECORDED IN

PLAT BOOK _____ , PAGE _____ .

BY:_____
REGISTER OF DEEDS

BY:_____
DEPUTY/ASSISTANT

DRAWING DATE; JUNE 12, 2012

SCALE: 1"=50'	SHEET NO. 3 OF 3		
DRAWN BY: CJG	DRAWING NAME: S042BW01.DWG	PROJECT NO.: S-042B	FIELD WORK: 12/2010-5/2012

REV.	DESCRIPTION	DATE

ASBUILT SURVEY FOR
STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM
FLETCHER-MERITOR STREAM RESTORATION
SCO PROJECT#: 040630201

TOWN OF FLETCHER, HENDERSON COUNTY, NORTH CAROLINA

Fletcher-Meritor Site (UT to Cane Creek) Stream and Wetland Restoration
Henderson County, North Carolina

FINAL REPORT

SCO Project Number: **040630201A**

August 2012

Owning Agency:

NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM
Department of Environmental and Natural Resources
116 West Jones St., Suite G111
Raleigh, NC 27603

Prepared by:

HDR Engineering of the Carolinas, Inc.
3733 National Drive, Suite 207
Raleigh, NC 27612

8/13/12

TABLE OF CONTENTS

Page Number

Print Form

STATE CONSTRUCTION OFFICE

FINAL REPORT CHECKLIST

Institution: North Carolina Ecosystem Enhancement Program (NCEEP)

Project Title: Fletcher-Meritor Site (UT to Cane Creek) Stream and Wetland Restoration Project

SCO ID Number: 04-06302-01A Code: Item: DCC:

SCO Monitor: Clyde Carl

The final report is to be compiled in the following order and should include the following information as required in Chapter 600 of the NC State Construction Manual (http://www.nc-sco.com/Manual/manual.htm). The Final Report can be submitted as a hard copy or as a digital copy; digital is the preferred method.

1. Title Page with Project Name and Location, Owning Agency, SCO State ID Number, Design Firm Information and Seal of Designer of Record signed and dated
2. Table of Contents
3. Final Report Checklist
4. SCO Final Inspection for Owner Occupancy Form
5. Contract Dates:
   a. Bid Opening Date
   b. Award Date
   c. Begin Work Date
   d. Final Inspection Date
   e. Project Acceptance Date
   f. Warranty Expiration Date
6. "Exhibit A" Project Description (Give a complete description of the project)
   a. Architectural (Gross Square Feet or other Units describing type of work done, Exterior Design, Interior Construction & Finish)
   b. Structural
   c. Plumbing
   d. HVAC
   e. Electrical
7. "Exhibit B" Cost Data (For formatting in Final Report only – DO NOT FILL OUT HERE)

Contracts	Project Contract Fee	Total Change Orders/ Amendments	Subtotal
Single Prime Contract	$ -	$ -	$ -
Multi-Prime Contracts			
General Contract	$ -	$ -	$ -
Plumbing Contract	$ -	$ -	$ -
HVAC Contract	$ -	$ -	$ -
Electrical Contract	$ -	$ -	$ -
Design Contract	$ -	$ -	$ -
Owner Costs*	$ -	$ -	$ -
Total Contract Fees	**$ -**	**$ -**	**$ -**

*Owner Costs should be broken out and could include: surveys, soil investigations, concrete tests, advertising,etc.

8. "Exhibit C" Change Order Breakdown *(if applicable)*

9. "Exhibit D" List of Contractors, Subcontractors and Material Suppliers

10. "Exhibit E" Energy Criteria Description

11. "Exhibit F" Designer Certification Documents

    a. SCO Certificate of Completion (with required attachments)
    b. SCO Certificate(s) of Compliance *(from Designer and each Consultant)*

12. "Exhibit G" Construction Close-Out Documents (copies w/ visible seals)

    a. SCO Contractor's Affidavit of Release of Liens
    b. SCO Contractor's Affidavit of Payment of Debts and Claims
    c. SCO Consent of Surety of Final Payment
    d. Complete Final Pay Application

13. Are there any unsettled claims? ☒ No ☐ Yes

14. As-Built Drawings: Include two sets of formatted digital media (CD or DVD)*: one full set in .pdf format and one full set in .dwg format as outlined in Chapter 600 of the State Construction Manual.

    *Note: SCO no longer requires a hard copy of the As-Builts.
    Label on discs should include the project SCO State ID Number, project name and location, the owning agency's name, the designer's name, and the format of files (.pdf or .dwg). All file names shall correlate with actual sheet numbers.

Designer:	HDR Engineering, Inc. of the Carolinas
Design Firm Information:	3733 National Drive, Suite 207, Raleigh, NC 27612
Designer Phone Number:	919-785-1118
Designer E-Mail Address:	wyatt.yelverton@hdrinc.com
Date Sent to SCO:	August 17, 2012
Capital Project Coordinator:	Edward Hajnos
Capital Project Coordinator E-Mail Address:	edward.hajnos@ncdenr.gov

DO NOT WRITE BELOW THIS LINE
State Construction Use Only

CDs Received: ☐ .pdf ☐ .dwg/similar

Accepted By: _____ On: _____

with confirmation from the State Construction Monitor on this project.

SCO Project ID# 040630201A

EEP IMS ID # IMS #138

PROJECT INSPECTION CHECKLIST & ACCEPTANCE

(Include this Project Inspection Checklist & Acceptance Form with the Final Report)

Project Name: Fletcher-Meritor Site (Tributary to Cane Creek) Stream and Wetland Restoration Project

Owning Agency: NC DENR – Ecosystem Enhancement Program

Project Manager: Deborah Daniel

Review Coordinator: Lin Xu

Design Firm: HDR Engineering Inc. of the Carolinas

Onsite Manager: Wyatt Yelverton

SCO Monitor: Clyde Carl

Contract Dates: Start: November 28, 2012 End: May 28, 2012

SUBSTANTIAL COMPLETION

1. The Substantial Completion Walk Through was held by the designer and contractor. — May 30, 2012 (Date)
2. The designer accepted the project as substantially complete. — May 30, 2012 (Date)

PRELIMINARY FINAL INSPECTION CHECKLIST – Designer, Contractor & Owning Agency

1. The as-built survey was submitted to the designer by the contractor for a review of accuracy and compliance to contractual requirements. — June 1, 2012 (Date)
2. The contractor's statement of project completion, and a request for an inspection was received by the designer. *(attach copy)* — May 24, 2012 (Date)
3. A Preliminary Final Inspection was led by the designer and attended by the contractor and Owning Agency. — May 30, 2012 (Date)
4. The Preliminary Final Inspection punch list was generated by the designer and copies were distributed to the contractor and the Owning Agency. (*attach copy*) — May 31, 2012 (Date)
5. The contractor's statement of punch list completion and a final inspection request was received by the designer. (*attach copy*) — June 13, 2012 (Date)
6. The final as-built survey was reviewed and accepted by the designer and Owning Agency. — June 13, 2012 (Date)

Designer's Statement:

HDR Engineering, Inc. of the Carolinas (design firm) affirms that all construction has been inspected, the as-built survey has been verified, the project meets the contract requirements, the project is substantially complete, and a final inspection will be scheduled.

Designer Representative Signature — 6-13-12 (Date)

SCO Project ID# 040630201A

EEP IMS ID # IMS #138

FINAL INSPECTION – Designer, Contractor, Owning Agency & SCO

DISAPPROVAL – *if applicable*

The project cannot be accepted as complete for the following reason(s):

_____

_____

_____

_____

_____ _____

Designer Representative Signature Date

_____ _____

Owner Representative Signature Date

_____ _____

SCO Representative Signature Date

Designer's Statement:

_____ (design firm) affirms that the delinquencies above have been corrected, the site has been re-inspected, the as-built survey has been verified, the project meets the contract requirements, and the project is ready for a Final Inspection.

_____ _____

Designer Representative Signature Date

ACCEPTANCE

A Final Inspection was led by the designer and was attended by the Contractor, Owning Agency & SCO. 6-14-12 Date

The established date for guarantees and warranties to commence is: 6-14-12 Date

The date that insurance coverage (required by Article 34 of the General Conditions) may be cancelled is: 6-14-12 Date

Comments:

_____

_____

_____

Designer Approval: _____ 6-14-12

Representative Signature Date

Owner Approval: Deborah A Daniel 6-14-12

Representative Signature Date

SCO Acceptance: Clyde V. Carf 6/14/12

Representative Signature Date

Buchanan and Sons Inc

P.O. Box 123
Whittier, NC 28789

Phone: (828) 497-9720
Fax: (828) 497-9721
Mobile: (828) 226-0275
Email: chris@bsi-construction.com

Design/ Build Construction

Sitework Design, Layout, and Construction

Excavation

Storm Water Systems

Construction of Roads and Parking Lots

Slipforming of Concrete Curbing and Sidewalk

Fountain Design and Construction

Brick Pavers

Concrete Work Including Walls, Steps, and Slabs

Segmental Retaining Walls

Sanitary Sewer

Water Line Installation

Structural Concrete

June 13, 2012

HDR Engineering of the Carolinas, Inc.
Attn: Wyatt Yelverton
3733 National Drive
Raleigh, NC 27612

RE: Fletcher-Meritor Site (UT to Cane Creek)
Project ID: HENDE-2009-012
SCO Project Number: 040630201

Dear Mr. Yelverton:

Please accept this letter as Buchanan and Sons Inc's formal response to the Punch List dated May 30, 2012. Each item is listed out in detail below with BSI's responses directly following in red.

1. Over-seed areas where grass germination is sparse, mainly on inside meanders and the confluence of the tributary and upper reach and lower reach from confluence with tributary to just below NPDES crossing. Apply light coat of straw in areas that are to be over-seeded where there isn't any straw left. Completed.

2. Have HARP add additional plantings in the floodplain/overbank area in the vicinity of the stream storm repair. There was a strip left out in order to make the repair. Now that the repair is finished, it can be planted. Response from HARP (This was planted in the last trip to install on May 14th, 2012. Perhaps the grass is too tall to see the bare root trees.)

3. In the same area as #2 above but across the stream on the left bank, the plantings seem too sparse. Have HARP verify the spacing of bare roots and add additional plantings if necessary. Response from HARP (This was planted the last time at the site May 14th, 2012. We installed per the specs.)

4. Have HARP verify the last brush mattress on the lower reach for proper species and survivability. At this point, if HARP has any material left, they can either replace the brush mattress or live stake the bank on 1' centers. Response (Buchanan and Sons has consulted with HARP and cannot determine whether or not the brush mattress in question will survive at this time. Due to unavailability of materials, Buchanan and Sons recommends that

this item be reviewed in the fall and if this item does not survive BSI will replace under terms of the contract warranty.)

5. Pick up any remaining trash on-site. Completed.

6. Relocated 3 CE posts: a) 2 on either side of the permanent road crossing - relocate higher up on floodplain or terrace and b) post at end of project currently sitting in the stream - relocated up on terrace. Completed

7. Install strapping for NPDES pads. Completed.

8. Verify bare roots/container plants planted in first wetland area (Bank Right as you are walking upstream in UR from road) are inside CE. If outside CE, relocate if possible. Completed

Please feel free to contact us with any questions or concerns you may have.

Sincerely,

Christopher Buchanan
Vice President

TO: **Debbie Daniel**
NC Ecosystem Enhancement Program

FROM: **James Rice, HDR**

DATE: **May 30, 2012**

MEMORANDUM
Raleigh, North Carolina

SUBJECT: Fletcher Preliminary Final Inspection Minutes and Punch List

---

In attendance:

Debbie Daniel	*EEP*
Lin Xu	*EEP*
Carl Buchanan	*BSI*
Chris Buchanan	*BSI*
James Rice	*HDR*

The meeting was held Wednesday May 30th, 10:00 am at the project site.

The Preliminary Final Inspection involved a walkthrough of the entire site in order to inspect the completed work and note any discrepancies. Based upon all discussions and concerns mentioned at the preliminary final walkthrough, the following is the list of punch list items to be completed prior to the final walkthrough.

1. Over-seed areas where grass germination is sparse, mainly on inside meanders and the confluence of the tributary and upper reach and lower reach from confluence with trib to just below NPDES crossing. Apply light coat of straw in areas that are to be over-seeded where there isn't any straw left.

2. Have HARP add additional plantings in the floodplain/overbank area in the vicinity of the stream storm repair. There was a strip left out in order to make the repair. Now that the repair is finished, it can be planted.

3. In the same area as #2 above but across the stream on the left bank, the plantings seem too sparse. Have HARP verify the spacing of bare roots and add additional plantings if necessary.

4. Have HARP verify the last brush mattress on the lower reach for proper species and survivability. At this point, if HARP has any material left, they can either replace the brush mattress or live stake the bank on 1' centers.

5. Pick up any remaining trash on-site.

6. Relocated 3 CE posts: a) 2 on either side of the permanent road crossing - relocate higher up on floodplain or terrace and b) post at end of project currently sitting in the stream - relocated up on terrace.

7. Install strapping for NPDES pads.

8. Verify bare roots/container plants planted in first wetland area (Bank Right as you are walking upstream in UR from road) are inside CE. If outside CE, relocate if possible.

Buchanan and Sons Inc

P.O. Box 123
Whittier, NC 28789

Phone: (828) 497-9720
Fax: (828) 497-9721
Email: chris@bsi-construction.com

Design/ Build Construction

Sitework Design, Layout, and Construction

Excavation

Storm Water Systems

Construction of Roads and Parking Lots

Slipforming of Concrete Curbing and Sidewalk

Fountain Design and Construction

Brick Pavers

Concrete Work Including Walls, Steps, and Slabs

Segmental Retaining Walls

Sanitary Sewer

Water Line Installation

Structural Concrete

May 24, 2012

HDR Engineering of the Carolinas, Inc.
Attn: Wyatt Yelverton
3733 National Drive
Raleigh, NC 27612

RE: Project Completion
Fletcher-Meritor Site (UT to Cane Creek)
Project ID: HENDE-2009-012
SCO Project Number: 040630201

Dear Mr. Yelverton:

We anticipate completion of the project by Friday, May 25, 2012. The only item of work yet to be finished is the site signage, which will be done tomorrow.

Please let us know when you have scheduled the final walk-through.

Sincerely,

Christopher Buchanan
Vice President

Final Report

Project: Fletcher-Meritor Site (UT to Cane Creek) Stream and Wetland Restoration

Location: Henderson County, North Carolina

Project Number: 040630201A

Owner: North Carolina Department of Environmental and Natural Resources, North Carolina Ecosystem Enhancement Program

Designer: HDR Engineering, Inc. of the Carolinas

Prime Contractor: Buchanan and Sons, Inc.

General Project Description

This project involved approximately 4,265 linear feet of stream restoration and 6.7 acres of wetland restoration including floodplain and channel grading, construction of in-stream structures, erosion control, and vegetative planting.

Project Location

The project is located in the Town of Fletcher in Henderson County. From I-26, the project site is found by taking US-25N (US-25 Business) via Exit 44 toward Fletcher/Mountain Home. After approximately 1.3 miles, take a left on Rockwell Road. The project is approximately 0.4 miles on the right off Rockwell Road.

Contract Dates

ACTION	DATE
Bid Opening	July 8, 2011
Award of Contract	August 31, 2011
Pre-Construction Conference	November 16, 2011
Notice to Proceed	November 16, 2011
Start of Construction	November 28, 2011
Final Inspection	June 14, 2012
Project Acceptance	August 8, 2012
Warranty Expiration	June 14, 2013

Exhibit A – Project Description

The restoration property tract is owned by the Town of Fletcher and is located approximately 500 feet to the west of US 25 and along the north side of Rockwell Drive within the 100-year floodplain of Cane Creek, which drains to the French Broad River. Cane Creek is a North Carolina Class C stream that is listed upstream of US 25 as impaired on the 303(d) list for North Carolina (NCDWQ 2005).

In the upper portion of the Main Stem of UT to Cane Creek (Upper Reach), approximately 1,520 linear feet of the channelized reach was restored to a natural planform resulting in an increased length of approximately 1,838 linear feet of meandering C/E-type stream. This Priority II restoration strategy included building a bankfull bench (ranging from 12 to 15 feet in width) along each side of a meandering channel to the stream's confluence with the Tributary. A Priority II restoration approach was also employed to build a floodplain bench ranging from 13 to 17 feet in width along the Main Stem from the confluence with the Tributary to the confluence with Cane Creek (old channel approximately 1,320 linear feet). This 1,802 linear foot reach (Lower Reach) was designed as a meandering C/E-type channel that tied into the current elevation of Cane Creek. Due to property line issues realized during construction, the final meander bend near the confluence with Cane Creek was removed. This resulted in a final constructed segment of 1,779 linear feet instead of the 1,802 anticipated.

The various tributaries to the UT were approached in two ways: two ditches were plugged or rerouted to help restore the hydrology of two onsite, currently non-jurisdictional wetlands (approximately 6.34 acres), and the Tributary (a small, 1st order, perennial channelized reach approximately 550 linear feet) was restored to create approximately 648 linear feet of meandering channel using a Priority II approach.

The goals of this restoration project were to improve local water quality and restore aquatic and riparian habitat. The objectives of the restoration project focused on restoring approximately 2,840 linear feet of a degraded section of UT to Cane Creek and 550 linear feet of an associated tributary to stable channels using natural channel restoration methodologies as well as reestablishing hydrology and hydrophytic vegetation to 6.7 acres of historical wetlands. This was accomplished by:

- Reestablishing stream stability and capacity to transport watershed flows and sediment load by restoring stable channel morphology, supported with instream habitat and grade/bank stabilization structures;
- Reducing non-point source sedimentation and nutrient inputs into the identified project reaches through the elimination of accelerated bank erosion and reestablishment of native riparian buffer;
- Enhancing the capacity of the stream system, by building a bankfull bench and restoring wetlands for attenuation and water quality benefits; and
- Reestablishing the floodplain connectivity by creating the floodplain bench at existing elevations.

Square Foot / Unit Description of Work Performed:

Linear Feet of Channel and Floodplain Grading	4265	Linear Feet
Rock Cross Vanes	3	Each
Log Cross Vanes	16	Each
Log Vane w/ Rootwads	39	Each
Log Vane w/ Rootwad and Log Sill	3	Each
Brush Mattress	8	Each
Coir Fiber Matting	5760	SY
Permanent Stream Crossing	1	Each
Aerial Sewer Crossing	1	Each
Temporary Seeding	42	Acres
Permanent Seeding	21	Acres
Live Stakes	6534	Each
Bare Root Seedlings	7085	Each
Containerized Plants (1 gal)	156	Each
Vegetation Plugs	278	Each

Project Breakdown:

- 4265 Linear Feet of Stream Restoration (Combined Upper, Lower, and Tributary Reaches)
- 6.7 acres of Wetland Restoration (Anticipated). Future monitoring will determine the actual amount of restored wetland.

EXHIBIT B – Project Cost Data

Contract	Project Contract Fee	Total Change Orders / Amendments	Subtotal
Single Prime Contract	$762,969.00	$18,047.60	$781,016.60
Multi-Prime Contracts	n/a	n/a	n/a
General Contract	n/a	n/a	n/a
Plumbing Contract	n/a	n/a	n/a
HVAC Contract	n/a	n/a	n/a
Electrical Contract	n/a	n/a	n/a
Design Contract	$314,962.00	$35,038.00	$350,000.00
Owner Costs*	$536.79	$0.00	$536.79
Total Contract Fees	**$1,078,467.79**	**$53,085.60**	**$1,131,553.39**

*Owner Costs consisted of advertising costs only.

EXHIBIT C - Change Order Breakdown

Change Order Number	Description	Addition/Deduction	Revised Contract Amount
1	No Cost Time Extension	$0.00	No Revision
2	No Cost Time Extension	$0.00	No Revision
3	No Cost Time Extension	$0.00	No Revision
4	Final Quantity Adjustments (over/under runs), Additional costs associated with extra survey work (datum correction, placement on permanent monuments)	$18,047.60	$781,016.60

EXHIBIT D – List of Contractors, Subcontractors and Material Suppliers

Prime Contractor: Buchanan and Sons, Inc.
P.O. Box 123
Whittier, NC 28789

Subcontractors: Planting: Habitat Assessment and Restoration Program, Inc.
301 McCullough Drive, 4th Floor
Charlotte, NC 28262

Surveying: Terminus Land Surveying, PLLC
28 Bessie Dr.
Fletcher, NC 28732

Material Suppliers:

Company	Address	Description of Services
Shea D Farms	1705 Biggers Cemetary Rd Monroe, NC 28110	Provided wheat straw
Vulcan Materials	157 Hendersonville Quarry Hendersonville, NC 28792	Provided stone
K&M Products of NC, Inc.	3248 Patton Rd Franklin, NC 28734	Provided wood stakes, coir matting, dewatering bags
Protech Environmental	1500 Continental Blvd, St. C/F Charlotte, NC 28273	Provided wetland seed mix and wattles
Ferguson Enterprises	35 London Rd. Asheville, NC 28803	Provided manholes, Geotex nonwoven fabric, RCP pipe, safety fence, silt fence, filter bags, sod staples, coir matting, sand bags
Able Rent-A-Jon	108 Sweeten Creek Rd. Asheville, NC 28803	Provide portable toilet services
Polar Leasing Co. Inc.	4410 New Haven Ave. Fort Wayne, IN 46803	Provided refrigerated trailer for plant storage
Fletcher Lawn & Garden	38 Johnston St. Fletcher, NC 28732	Provided tools, grass seed, wood stakes, straw, rebar, poly, wire
MSC Waterworks	1260 Sweeten Creek Rd. Asheville, NC 28801	Provided grout, nonwoven fabric, sand bags
Parker Oil Inc.	290 Depot Street Asheville, NC 28801	Provided off road fuel
ARC	PO Box 277470 Atlanta, GA 30384	Provided construction signs
Cure Nursery	880 Buteo Ridge Road Pittsboro, NC 27312	Provided containerized plants
Foggy Mountain Nursery LLC	2251 Ed Little Road Creston, NC 28615	Provided live stakes and brush mattress
Arborgen, South Carolina Supertree Nursery	5594 Hwy 38 South Blenheim, SC 29516	Provided bare root seedlings for planting
NC Division of Forest Resources	762 Claridge Nursery Road Goldsboro, NC 27530	Provided bare root seedlings for planting
Habitat and Restoration Plants	534 Kentwood Lane Lexington, NC 27295	Provided containerized trees and shrubs for plantings
Little River Nursery	4037 Beersheba Highway McMinnville, TN 37110	Provided bare root seedlings for planting
Virginia Department of Forestry	90 Forestry Center Lane Crimora, VA 24431	Provided bare root seedlings for planting

Exhibit E – Energy Criteria Description

Not Applicable to this Project

Exhibit F – Designer Certification Documents

See the following Certificates including SCO Certificate of Completion and SCO Certificate of Compliance.

SECTION 324

SCO CERTIFICATE OF COMPLIANCE;

PROJECT: **Fletcher-Meritor Site (Tributary to Cane Creek) Stream and Wetland Restoration Project**	
LOCATION: **Fletcher, NC (Henderson County)**	
BUDGET CODE:	ITEM:
SCO PROJECT ID: **040630201A**	
OWNER: **DENR – NC Ecosystem Enhancement Program**	
TYPE OF CONTRACT: **Formal**	FINAL AMOUNT:**$781,016.60**
DATE OF FINAL ACCEPTANCE: **8/8/2012**	
CONTRACTOR: **Buchanan and Sons, Inc.**	

I (we) certify that the work on the above-referenced project has been inspected in accordance with Chapter 133, Article 1, of the General Statutes, and that:

(1) The inspections of the construction, repairs or installations have been conducted with the degree of care and professional skill and judgment ordinarily exercised by a member of my (our) profession; and

(2) to the best of my (our) knowledge, and in my (our) professional opinion as an architect or engineer, the contractor has fulfilled the obligations of such plans, specifications and contract.

Signed this 13th day of August, 2012

Designer Signature

(SEAL)_

Wyatt D. Yelverton, PE
Designer Name

Hydraulic Engineer
Discipline/Title

8/13/12

SECTION 326

SCO CERTIFICATE OF COMPLETION;

PROJECT: **Fletcher-Meritor Site (Tributary to Cane Creek) Stream and Wetland Restoration Project**	
LOCATION: **Fletcher, NC (Henderson County)**	
BUDGET CODE:	ITEM:
SCO PROJECT ID: **040630201A**	DATE: **13 August, 2012**
OWNER: **DENR – NC Ecosystem Enhancement Program**	
DESIGNER: **HDR Engineering, Inc. of the Carolinas**	
PRIME CONTRACTOR: **Buchanan and Sons, Inc.**	

I (we) certify that all work on the above referenced project has been completed according to the plans, specifications, addenda and approved change orders and that the project is ready for owner occupancy.

The final inspection was made on June 14th, 2012. The guarantee period begins on June 14th, 2012 and shall terminate on June 14th, 2013.

The contractors report that final payments have been made to all material suppliers, employees and subcontractors, and copies of their lien waivers are attached.

Builder's risk insurance was cancelled as of July 04, 2012 and a copy of the cancellation notice is attached hereto.

The total time for completion as allowed in the contract plus granted time extensions is 182 days. The actual time required for completion was 182 days, and the contractor is not liable for liquidated damages.

Copies of the following items are attached as indicated below:

Affidavits: -Contractor's Affidavit of Release of Liens

-Contractor's Affidavit of Payment of Debts and Claims

-Consent of Surety Company to Final Payment

-Complete and Final Pay Application

-Cancellation of Builders Risk Insurance

There are no unsettled disputes between the owner and contractor, owner and designer, or the designer and contractor at this time.

Signed this 13th day of August, 2012.

(SEAL)

Designer Signature

Wyatt D. Yelverton, PE
Designer Name

Hydraulic Engineer
Title

8/13/12

Exhibit G – Construction Close-Out Documents

See the following Close-Out Documents including:

A. SCO Contractors Affidavit of Release of Liens

B. SCO Contractor's Affidavit of Payment of Debts and Claims

C. SCO Consent of Surety of Final Payment

D. Complete Final Pay Application

SECTION 316

	Owner	☐
	Designer	☐
CONTRACTOR'S	Contractor	☐ Code_____Item_____
AFFIDAVIT OF	Surety	☐
RELEASE OF LIENS	Other	☐

For Use with State of North Carolina Projects

TO: (OWNER) NCEEP	CONTRACT FOR: SCO#040630201 Fletcher-Meritor Site (UT to Cane Creek) Stream and Wetland Restoration Project CONTRACT DATE: 31 August 2011

SCO PROJECT ID: SCO#040630201

PROJECT INFORMATION:
(Name & Location) Fletcher-Meritor Site (UT to Cane Creek) Stream and Wetland Restoration Project in Fletcher, North Carolina

State of: North Carolina

County of: Jackson

The undersigned, pursuant to Article 36 of the General Conditions of the Contract, hereby certifies that to the best of his knowledge, information and belief, the Releases or Waivers of Lien attached hereto include the contractor, all subcontractors, all suppliers of materials and equipment, and all performers of work, labor or services who have or may have liens against any property of the owner arising in any manner out of the performance of the contract referenced above.

SUPPORTING DOCUMENTS ATTACHED HERETO:

CONTRACTOR: Buchanan and Sons Inc

Address: PO Box 123, Whittier, NC 28789

By Christopher Buchanan, VP

Subscribed and sworn to before me
This 9 day of July 2012

Signature Notary Public: Emily L Knapp

Printed Name of Notary Public: Emily L Knapp

My Commission Expires: March 15, 2016

Owner ☐

Designer ☐

CONTRACTOR'S Contractor ☐ Code _____ Item _____

AFFIDAVIT OF PAYMENT Surety ☐

OF DEBTS AND CLAIMS Other ☐

For Use with State of North Carolina Projects

TO (OWNER):
NCEEP

CONTRACT FOR: SCO#040630201 Fletcher-Meritor Site (UT to Cane Creek) Stream and Wetland Restoration Project

CONTRACT DATE: 31 August 2011

PROJECT INFORMATION:
Name & Location:
SCO#040630201 Fletcher-Meritor Site (UT to Cane Creek) Stream and Wetland Restoration

State of: North Carolina
County of: Jackson

The undersigned, pursuant to Article 36 of the General Conditions of the Contract, hereby certifies that, he has paid in full or has otherwise satisfied all obligations for all materials and equipment furnished, for all work, labor and services performed, and for all known indebtedness and claims against the contractor for damages arising in any manner in connection with the performance of the contract referenced above for which the owner or his property might in any way be held responsible.

SUPPORTING DOCUMENTS ATTACHED HERETO:
1. Consent of Surety to Final Payment. Whenever surety is involved, Consent of Surety is required.
   Indicate attachment: Yes
   The following supporting documents should be attached hereto if required by the owner:
   a. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.
   b. Separate Releases or Waivers of Liens from subcontractors and material and equipment suppliers to the extent required by the owner, accompanied by a list thereof.
   c. Contractor's Affidavit of Release of Liens.

CONTRACTOR: Buchanan and Sons Inc
Address: PO Box 123, Whittier, NC 28789

By: Christopher Buchanan, VP
Christopher Buchanan, Vice President

Subscribed and sworn to before me this _9_day of July_ 2012_
Signature of Notary Public: Emily L Knapp

Printed Name of Notary Public: Emily L Knapp
My Commission Expires: March 15, 2016

Owner ☐

Designer ☐

CONSENT OF SURETY Contractor ☐ SCO ID # 040630201

COMPANY TO FINAL Surety ☐

PAYMENT Other ☐

For Use with State of North Carolina Projects

Fletcher-Meritor Site, (Unnamed Tributary to Cane Creek), Fletcher, Henderson Co., NC
PROJECT Name & Location:

TO: (OWNER)
State of North Carolina through the North Carolina Ecosystem Enhancement Program (NCEEP)

CONTRACT FOR: Construction

CONTRACT DATE: August 31, 2011

CONTRACTOR: Buchanan and Sons, Inc.

In accordance with the provisions of the contract between the owner and the contractor as indicated above, the Hudson Insurance Company, 17 State Street, 29th Floor, New York, NY 10004
SURETY COMPANY

on bond of Buchanan and Sons, Inc., P. O. Box 123, Whittier, NC 28789
CONTRACTOR

hereby approves of the final payment to the contractor, and agrees that final payment to the contractor shall not relieve the surety company of any of its obligations to

State of North Carolina through the North Carolina Ecosystem Enhancement Program (NCEEP), 2728 Capital Boulevard, Suite 1H-103, Raleigh, NC 27604
OWNER

as set forth in said surety company's bond.

IN WITNESS WHEREOF, Hudson Insurance Company
the surety company has hereunto set its hand this 13th day of July , 2012

Hudson Insurance Company
Surety Company

By: Karen K. Beard
Signature of Authorized Representative

Karen K. Beard
Title Attorney-in-Fact

Attest: Susan R. Russell

(Visible Seal):

HUDSON
INSURANCE GROUP®

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS: That HUDSON INSURANCE COMPANY, a corporation of the State of Delaware, with offices at 300 First Stamford Place, Stamford, Connecticut, 06902, has made, constituted and appointed, and by these presents, does make, constitute and appoint

Karen K. Beard and Wallace N. Hyde of the State of North Carolina

its true and lawful Attorney(s)-in-Fact, at Stamford in the State of Connecticut, each of them alone to have full power to act without the other or others, to make, execute and deliver on its behalf, as Surety, bonds and undertakings given for any and all purposes, also to execute and deliver on its behalf as aforesaid renewals, extensions, agreements, waivers, consents or stipulations relating to such bonds or undertakings provided, however, that no single bond or undertaking shall obligate said Company for any portion of the penal sum thereof in excess of the sum of Five Million Dollars ($5,000,000).

Such bonds and undertakings when duly executed by said Attorney(s)-in-Fact, shall be binding upon said Company as fully and to the same extent as if signed by the President of said Company under its corporate seal attested by its Secretary.

In Witness Whereof, HUDSON INSURANCE COMPANY has caused these presents to be of its Executive Vice President thereunto duly authorized, on this 17th day of August, 2007 at Stamford, Connecticut.

(Corporate seal)

Hudson Insurance Company SEAL 1918 DELAWARE

HUDSON INSURANCE COMPANY

Attest.....
Peter H. Lovell, Corporate Secretary

By.....
Christopher L. Gallagher, Executive Vice President

STATE OF CONNECTICUT
COUNTY OF FAIRFIELD. SS.

On the 17th day of August, 2007 before me personally came Christopher L. Gallagher to me known, who being by me duly sworn did depose and say that he is an Executive Vice President of **HUDSON INSURANCE COMPANY**, the Company described herein and which executed the above instrument, that he knows the seal of said Company, that the seal affixed to said instrument is the corporate seal of said Company, that it was so affixed by order of the Board of Directors of said Company, and that he signed his name thereto by like order.

(Notarial Seal)

CORINNE BRENNAN NOTARY PUBLIC FAIRFIELD COUNTY, CONNECTICUT

Corinne Brennan
Notary Public of Connecticut
My Commission Expires February 28, 2010

CERTIFICATION

STATE OF CONNECTICUT
COUNTY OF FAIRFIELD SS.

The undersigned Peter H. Lovell hereby certifies:

That the original resolution, of which the following is a true and correct copy, was duly adopted by unanimous written consent of the Board of Directors of Hudson Insurance Company dated July 27th, 2007, and has not since been revoked, amended or modified:

"RESOLVED, that the President, the Executive Vice Presidents, the Senior Vice Presidents and the Vice Presidents shall have the authority and discretion, to appoint such agent or agents, or attorney or attorneys-in-fact, for the purpose of carrying on this Company's surety business, and to empower such agent or agents, or attorney or attorneys-in-fact, to execute and deliver, under this Company's seal or otherwise, bonds obligations, and recognizances, whether made by this Company as surety thereon or otherwise, indemnity contracts, contracts and certificates, and any and all other contracts and undertaking made in the course of this Company's surety business, and renewals, extensions, agreements, waivers, consents or stipulations regarding undertakings so made; and

FURTHER RESOVLED, that the signature of any such Officer of the Company and the Company's seal may be affixed by facsimile to any power of attorney or certification given for the execution of any bond, undertaking, recognizance, contract of indemnity or other written obligation in the nature thereof or related thereto, such signature and seal when so used whether heretofore or hereafter, being hereby adopted by the Company as the original signature of such officer and the original seal of the Company, to be valid and binding upon the Company with the same force and effect as though manually affixed."

Witness the hand of the undersigned and the seal of said Company this 13th day of July, 20 12.

(Corporate seal)

By.....
Peter H. Lovell, Corporate Secretary

Form B 73

HDR ONE COMPANY | *Many Solutions*®

July 31, 2012

Debbie Daniel
NC Ecosystem Enhancement Program
5 Ravenscroft Dr., Suite 102
Asheville, NC 28801

RE: Fletcher-Meritor Site (UT to Cane Creek) Stream and Wetland Restoration
SCO# 040630201A, Pay Application 6 (FINAL)

Ms. Daniel,

We have received and reviewed the sixth and final pay application from Buchanan and Sons, Inc. regarding the above mentioned project. We have verified all field materials installed on the project to date and have obtained applicable material tickets from the contractor. Also included are costs associated with a final change order. Therefore, we certify the amount of **$97,461.57** to be paid to Buchanan and Sons, Inc. for work completed as shown in the Application and Certificate for Payment.

Original Contract Value	$762,969.00
Change Orders Adjustments	$18,047.60
Adjusted Contract Value	$781,016.60
Amount Previously Paid	$683,555.03
Retainage from Previous Payments	$35,976.58
Current Amount Due	**$97,461.57**
Balance of Contract Value	$0.00

Please let us know if you require any further documentation or have any questions regarding this pay application.

Sincerely,

Wyatt D. Yelverton, PE
HDR Engineering, Inc.

HDR Engineering, Inc.
3733 National Drive
Suite 207
Raleigh, NC 27612
Phone (919) 785-1118
Fax (919) 785-1187
www.hdrinc.com

AUTHORIZATION FOR PAYMENT
for
SC #04-06302-01-A
Fletcher-Meritor Site (UT to Cane Creek)

Summary of Payments Through: **30-Jul-12**

Buchanan & Sons, Inc. P.O. Box 123 Whittier, N.C.28789 FED. I.D. TAX # 56-2225815 I hereby certify that, to the best of my knowledge, this estimate is correct, due, and unpaid.	**Stream and Wetland Restoration Project** **Contract No.: SC #04-06302-01A** **Contract Begin Date** **28-Nov-11** **Contract End Date** **28-May-12** **Total Days** **182** **Appropriated Funds:** **$762,969.00**
Christopher Buchanan 07/30/2012 **CONTRACTOR** **Date**	**COMMENTS**
Approvals W. P. Gilmore 7-31-12 **Inspector / Proj. Mgr. (HDR, Inc.)** **Date**	**PERCENTAGE COMPLETE:** 100% **TIME COMPLETE:** 134.62% **TOTAL PROJECT OVERRUN =** $0.00
Project Manager (NC EEP) **Date**	**Comments:**
Program Manager (NC EEP) **Date**	
APPROVED FOR FIRST AND FINAL PAYMENT	LABOR/OVERHEAD CURRENT MATERIALS STORED MATERIALS TOTAL MATERIALS TOTALS
Fiscal Control **Date**	

Summary of Payments Through:	**30-Jul-12**
Appropriated Fund	$762,969.00
Total Change Orde	$18,047.60
New Contract Sum	$781,016.60
Total Value of Completed Work	$781,016.60
Less Previous Payments	$683,555.03
Value of Work Completed This Period	**$97,461.57**
Adjustments (Retainage @ 5%)	$0.00
Value of Work to be Paid this Month	**$97,461.57**
Plus 90% of Material on hand	**$0.00**
Liquidated Damag	$0.00
0 Days @ $1,000/Day	$0.00
TOTAL AMOUNT DUE THIS PERIOD	**$97,461.57**

CHANGE ORDERS

CO Number	Amount	Date	Source	New Contract Sum	Comments
4	$18,047.60	26-Jul-12		$781,016.60	Line Item Adjustments, Extra Survey Work
		Total Change Orde			

Contract PaymentHistory

	Value of Work Completed	Retainage 5.00%	Amount Invoiced	Stored Mat'l's. *
Payment No. 1:	**$100,392.00**	$5,019.60	$95,372.40	
Payment No. 2:	**$136,610.00**	$6,830.50	$129,779.50	
Payment No. 3:	**$152,507.10**	$7,625.36	$144,881.75	
Payment No. 4:	**$161,415.50**	$8,070.78	$153,344.73	
Payment No. 5:	**$168,607.00**	$8,430.35	$160,176.65	
Payment No. 6:				
Payment No. 7:				
Payment No. 8:				
Payment No. 9:				
Payment No. 10:				
Payment No. 11:				
Payment No. 12:				
Totals:	**$719,531.60**	**$35,976.59**	**$683,555.03**	

(Includes Amounts from this period)

*From Summary of Stored

Total Budget Remaining: **$61,485.00**

Fletcher-Meritor Site (UT to Cane Creek)

Contractor: Buchanan and Sons, Inc.
Superintendent: Carl Buchanan

Project Manager: Chris Buchanan

HDR Rpresentative
James Rice

MONTHLY INVOICE NUMBER 6 (Final)
MONTHLY SUMMARY OF ITEMS

All Sites Item No.	Item Description	Cont. Quantity & Unit		Quantity Used	Unit Price Bid	Total Value
1	Construction Survey	1.00	LS		$7,500.00	$0.00
2	As-Built Survey	1.00	LS	1.00	$5,500.00	$5,500.00
3	Mobilization	1.00	LS		$25,000.00	$0.00
4	Gravel Construction Entrance	1.00	EA		$1,500.00	$0.00
5	Incidental Stone Base	325.00	Tons		$30.00	$0.00
6	Safety Fence	400.00	LF		$5.00	$0.00
7	Proposed Road	717.00	LF	107.00	$95.00	$10,165.00
8	Aerial Sewer Crossing	1.00	LS		$32,000.00	$0.00
9	Grading	1.00	LS	0.05	$250,000.00	$12,500.00
10	Impervious Select Material	2,600.00	CY		$28.00	$0.00
11	Misc. #57 Stone	25.00	Tons		$35.00	$0.00
12	Miscellaneous Rip Rap: Class A	50.00	Ton		$65.00	$0.00
13	Miscellaneous Rip Rap: Class B	50.00	Tons		$65.00	$0.00
14	Miscellaneous Boulder	25.00	Ton		$100.00	$0.00
15	Rock Cross Vane	3.00	EA		$2,000.00	$0.00
16	Log Cross Vane	15.00	EA		$500.00	$0.00
17	Log Vane W/ Rootwad	39.00	EA		$650.00	$0.00
18	Log Vane W/ Rootwad and Rock Sill	3.00	EA		$850.00	$0.00
19	Brush Mattress	8.00	EA		$500.00	$0.00
20	Pump Around Operation	1.00	LS		$15,000.00	$0.00
21	Special Stilling Basin	5.00	EA		$700.00	$0.00
22	Coir Fiber Matting	4,420.00	SY	120.00	$5.00	$600.00
23	Silt Fence	2,800.00	LF		$4.00	$0.00
24	Temporary Rock Sill Check	4.00	EA		$250.00	$0.00
25	Temporary Stream Crossing	7.00	EA	1.00	$2,500.00	$2,500.00
26	Permanent Stream Crossing	1.00	EA		$17,500.00	$0.00
27	Temporary Seeding	42.00	AC	5.00	$1,300.00	$6,500.00
28	Permanent Seeding	21.00	AC		$1,900.00	$0.00
29	Live Stakes	6,534.00	EA		$2.50	$0.00
30	Bare Root Seedlings	7,085.00	EA	3,100.00	$2.40	$7,440.00
31	Transplant Scoop	10.00	EA	7.00	$500.00	$3,500.00

All Sites Item No.	Item Description	Cont. Quantity & Unit		Quantity Used	Unit Price Bid	Total Value
32	Containerized Plants (1 gal.)	150.00	EA	(6.00)	$10.00	-$60.00
33	Vegetation Plugs	278.00	EA	193.00	$5.00	$965.00
34	Signage	50.00	EA	56.00	$200.00	$11,200.00
						$60,810.00

Fletcher-Meritor Site (UT to Cane Creek)

Contractor: Buchanan and Sons, Inc.
Superintendent: Carl Buchanan
Project Manager: Chris Buchanan

HDR Representative: James Rice

Summary of Invoices through 7/30/2012
MONTHLY INVOICE NUMBER 6 (Final)

Bid Item No.	SP No.	Item Description	Comp. Y/N	Total this Month	Previous Total	Total to Date	Planned Quantity		Unit Cost	Contract Amount	Monthly Spent to Date	Total Spent to Date	Quantity Over/Under	Value Over/Under	% Complete
1	2.01	Construction Survey	Y		1.00	1.00	1.00	LS	$7,500.00	$7,500.00	$0.00	$7,500.00	1.00	$ -	100%
2	2.02	As-Built Survey	Y	1.00		1.00	1.00	LS	$5,500.00	$5,500.00	$5,500.00	$5,500.00	1.00	$ -	100%
3	2.03	Mobilization	Y		1.00	1.00	1.00	LS	$25,000.00	$25,000.00	$0.00	$25,000.00	1.00	$ -	100%
4	2.04	Gravel Construction Entrance	Y		1.00	1.00	1.00	EA	$1,500.00	$1,500.00	$0.00	$1,500.00	1.00	$ -	100%
5	2.05	Incidental Stone Base	Y		605.65	605.65	325.00	Tons	$30.00	$9,750.00	$0.00	$18,169.50	1.86	$ 8,419.50	186%
6	2.07	Safety Fence	Y		400.00	400.00	400.00	LF	$5.00	$2,000.00	$0.00	$2,000.00	1.00	$ -	100%
7	2.09	Proposed Road	Y	107.00	610.00	717.00	717.00	LF	$95.00	$68,115.00	$10,165.00	$68,115.00	1.00	$ -	100%
8	3.01	Aerial Sewer Crossing	Y		1.00	1.00	1.00	LS	$32,000.00	$32,000.00	$0.00	$32,000.00	1.00	$ -	100%
9	3.02	Grading	Y	0.05	0.95	1.00	1.00	LS	$250,000.00	$250,000.00	$12,500.00	$250,000.00	1.00	$ -	100%
10	3.04	Impervious Select Material	Y		2,600.00	2,600.00	2,600.00	CY	$28.00	$72,800.00	$0.00	$72,800.00	1.00	$ -	100%
11	4.01	Misc. #57 Stone	Y		25.00	25.00	25.00	Tons	$35.00	$875.00	$0.00	$875.00	1.00	$ -	100%
12	4.01	Miscellaneous Rip Rap: Class A	Y		50.00	50.00	50.00	Ton	$65.00	$3,250.00	$0.00	$3,250.00	1.00	$ -	100%
13	4.01	Miscellaneous Rip Rap: Class B	N		48.14	48.14	50.00	Tons	$65.00	$3,250.00	$0.00	$3,129.10	0.96	$ (120.90)	96%
14	4.01	Miscellaneous Boulder	Y		26.74	26.74	25.00	Ton	$100.00	$2,500.00	$0.00	$2,674.00	1.07	$ 174.00	107%
15	4.02	Rock Cross Vane	Y		3.00	3.00	3.00	EA	$2,000.00	$6,000.00	$0.00	$6,000.00	1.00	$ -	100%
16	4.03	Log Cross Vane	Y		16.00	16.00	15.00	EA	$500.00	$7,500.00	$0.00	$8,000.00	1.07	$ 500.00	107%
17	4.04	Log Vane W/ Rootwad	Y		39.00	39.00	39.00	EA	$650.00	$25,350.00	$0.00	$25,350.00	1.00	$ -	100%
18	4.05	Log Vane W/ Rootwad and Rock Sill	Y		3.00	3.00	3.00	EA	$850.00	$2,550.00	$0.00	$2,550.00	1.00	$ -	100%
19	4.06	Brush Mattress	Y		8.00	8.00	8.00	EA	$500.00	$4,000.00	$0.00	$4,000.00	1.00	$ -	100%
20	5.01	Pump Around Operation	Y		1.00	1.00	1.00	LS	$15,000.00	$15,000.00	$0.00	$15,000.00	1.00	$ -	100%
21	5.02	Special Stilling Basin	Y		5.00	5.00	5.00	EA	$700.00	$3,500.00	$0.00	$3,500.00	1.00	$ -	100%
22	5.04	Coir Fiber Matting	Y	120.00	5,640.00	5,760.00	4,420.00	SY	$5.00	$22,100.00	$600.00	$28,800.00	1.30	$ 6,700.00	130%
23	5.05	Silt Fence	Y		2,800.00	2,800.00	2,800.00	LF	$4.00	$11,200.00	$0.00	$11,200.00	1.00	$ -	100%
24	5.06	Temporary Rock Sill Check	Y		6.00	6.00	4.00	EA	$250.00	$1,000.00	$0.00	$1,500.00	1.50	$ 500.00	150%
25	5.07	Temporary Stream Crossing	Y	1.00	6.00	7.00	7.00	EA	$2,500.00	$17,500.00	$2,500.00	$17,500.00	1.00	$ -	100%
26	5.08	Permanent Stream Crossing	Y		1.00	1.00	1.00	EA	$17,500.00	$17,500.00	$0.00	$17,500.00	1.00	$ -	100%
27	6.01	Temporary Seeding	Y	5.00	37.00	42.00	42.00	AC	$1,300.00	$54,600.00	$6,500.00	$54,600.00	1.00	$ -	100%
28	6.02	Permanent Seeding	Y		21.00	21.00	21.00	AC	$1,900.00	$39,900.00	$0.00	$39,900.00	1.00	$ -	100%
29	6.03	Live Stakes	Y		6,534.00	6,534.00	6,534.00	EA	$2.50	$16,335.00	$0.00	$16,335.00	1.00	$ -	100%
30	7.03	Bare Root Seedlings	Y	3,100.00	3,985.00	7,085.00	7,085.00	EA	$3.40	$17,004.00	$7,440.00	$17,004.00	1.00	$ -	100%
31	7.04	Transplant Scoop	Y	7.00	3.00	10.00	10.00	EA	$500.00	$5,000.00	$3,500.00	$5,000.00	1.00	$ -	100%
32	7.04	Containerized Plants (1 gal.)	Y	(6.00)	156.00	150.00	150.00	EA	$10.00	$1,500.00	($60.00)	$1,500.00	1.00	$ -	100%
33	7.05	Vegetation Plugs	Y	193.00	85.00	278.00	278.00	EA	$5.00	$1,390.00	$965.00	$1,390.00	1.00	$ -	100%
34	8.01	Signage	Y	56.00		56.00	50.00	EA	$200.00	$10,000.00	$11,200.00	$11,200.00	1.12	$ 1,200.00	112%
		Extra Survey Work (Change Order 4)												$ 675.00	
									SUMMARY	**$762,969.00**	**$60,810.00**	**$780,341.60**		**$ 18,047.60**	

APPENDIX E

MBE DOCUMENTATION FOR CONTRACT PAYMENTS

Prime Contractor/Architect: Buchanan and Sons Inc

Address & Phone: P.O. Box 123, Whittier, NC 28789 828-497-9720

Project Name: Fletcher - Meritor Stream Restoration

SCO Project ID: 04-06302-01A

Pay Application #: 006 Period: 28 May 2012

The following is a list of payments made to Minority Business Enterprises on this project for the above-mentioned period.

MBE FIRM NAME	* TYPE OF MBE	AMOUNT PAID THIS MONTH (With This Pay App)	TOTAL PAYMENTS TO DATE	TOTAL AMOUNT COMMITTED
HARP	F,HUB	$21,508.24	$21,508.24	$ 30,716.50

*Minority categories: Black (B), Hispanic (H), Asian American (AA), American Indian (AI), White Female (WF), Socially and Economically Disadvantaged (SED)

Approved/Certified By:

Christopher Buchanan
Name

Vice President
Title

30 July 2012
Date

Christopher Buchanan
Signature

SUBMIT WITH EACH PAY REQUEST - FINAL PAYMENT - FINAL REPORT

STATE AND COUNTY SALES/USE TAX STATEMENT

Contractor/Subcontractor: Buchanan and Sons Inc

Project Name: Fletcher-Meritor Stream Restoration Project No.: (BSI 11-102)

Peroid Covered: Pay Application 006

County (use separate form for each) Jackson

Invoice Number	Invoice Date	Vendor	Total Amount of Invoice	Sales/Use Tax		
				State	County	Total
				4.75%	2.00%	6.75%
		No Sales Tax This Period				
TOTALS.....				$ -	$ -	$ -

I hereby certify that the above vendors were paid sales tax upon purchases of building materials during the period covered by this construction estimate, and the property upon which such taxes were paid was paid or will be used in the performance of this contract. No tax on purchases or rentals of tools and/or equipment is included in the above list. All of the materials above became a part of or are annexed to the building or structure being erected, altered, or repaired.

Sworn to and subscribed before me, this 30 day of July 2012.

Notary Public: Emily L Knapp
Emily L Knapp

My commission expires: March 15, 2016

Signature (Officer or Owner)

Christopher Buchanan, VP
Printed Name and Title

This for must be completed in its entirety, and attached to each Application for Payment and Sales Tax Invoice in order for reimbursement for tax to be received.

Fletcher (040630201A) Pay Application 6 (FINAL) - HDR Engineering Check							PREVIOUS PAY APPS.		CURRENT PAY APP.		JOB TO DATE (Completed)		
ITEM #	ITEM DESCRIPTION	S.P. SECTION	EST. QUANTITY	UNIT	UNIT PRICE	EST. AMOUNT	QUANTITY	AMOUNT	QUANTITY	AMOUNT	QUANTITY	AMOUNT	%
1	Construction Surveying	2.01	1	LS	$7,500.00	$7,500.00	1	$7,500.00		$0.00	1.00	$7,500.00	100.00%
2	As-Built Survey	2.02	1	LS	$5,500.00	$5,500.00		$0.00	1.00	$5,500.00	1.00	$5,500.00	100.00%
3	Mobilization	2.03	1	LS	$25,000.00	$25,000.00	1	$25,000.00		$0.00	1.00	$25,000.00	100.00%
4	Gravel Construction Entrance	2.04	1	EA	$1,500.00	$1,500.00	1	$1,500.00		$0.00	1.00	$1,500.00	100.00%
5	Incidental Stone Base	2.05	325	TON	$30.00	$9,750.00	605.65	$18,169.50		$0.00	605.65	$18,169.50	186.35%
6	Safety Fence	2.07	400	LF	$5.00	$2,000.00	400	$2,000.00		$0.00	400.00	$2,000.00	100.00%
7	Proposed Road	2.09	717	LF	$95.00	$68,115.00	610	$57,950.00	107.00	$10,165.00	717.00	$68,115.00	100.00%
8	Aerial Sewer Crossing	2.1	1	LS	$32,000.00	$32,000.00	1	$32,000.00		$0.00	1.00	$32,000.00	100.00%
9	Grading	3.02	1	LS	$250,000.00	$250,000.00	0.95	$237,500.00	0.05	$12,500.00	1.00	$250,000.00	100.00%
10	Impervious Select Material	3.04	2600	CY	$28.00	$72,800.00	2600	$72,800.00		$0.00	2600.00	$72,800.00	100.00%
11	Miscellaneous No. 57 Stone	4.01	25	TON	$35.00	$875.00	25	$875.00		$0.00	25.00	$875.00	100.00%
12	Miscellaneous Rip Rap – Class A	4.01	50	TON	$65.00	$3,250.00	50	$3,250.00		$0.00	50.00	$3,250.00	100.00%
13	Miscellaneous Rip Rap – Class B	4.01	50	TON	$65.00	$3,250.00	48.14	$3,129.10		$0.00	48.14	$3,129.10	96.28%
14	Miscellaneous Boulder	4.01	25	TON	$100.00	$2,500.00	26.74	$2,674.00		$0.00	26.74	$2,674.00	106.96%
15	Rock Cross Vane	4.02	3	EA	$2,000.00	$6,000.00	3	$6,000.00		$0.00	3.00	$6,000.00	100.00%
16	Log Cross Vane	4.03	15	EA	$500.00	$7,500.00	16	$8,000.00		$0.00	16.00	$8,000.00	106.67%
17	Log Vane with Rootwad	4.04	39	EA	$650.00	$25,350.00	39	$25,350.00		$0.00	39.00	$25,350.00	100.00%
18	Log Vane with Rootwad and Rock Sill	4.05	3	EA	$850.00	$2,550.00	3	$2,550.00		$0.00	3.00	$2,550.00	100.00%
19	Brush Mattress	4.06	8	EA	$500.00	$4,000.00	8	$4,000.00		$0.00	8.00	$4,000.00	100.00%
20	Pump Around Operation	5.01	1	LS	$15,000.00	$15,000.00	1	$15,000.00		$0.00	1.00	$15,000.00	100.00%
21	Special Stilling Basin	5.02	5	EA	$700.00	$3,500.00	5	$3,500.00		$0.00	5.00	$3,500.00	100.00%
22	Coir Fiber Matting	5.04	4420	SY	$5.00	$22,100.00	5640	$28,200.00	120.00	$600.00	5760.00	$28,800.00	130.32%
23	Silt Fence	5.05	2800	LF	$4.00	$11,200.00	2800	$11,200.00		$0.00	2800.00	$11,200.00	100.00%
24	Temporary Rock Silt Check	5.06	4	EA	$250.00	$1,000.00	6	$1,500.00		$0.00	6.00	$1,500.00	150.00%
25	Temporary Stream Crossing	5.07	7	EA	$2,500.00	$17,500.00	6	$15,000.00	1.00	$2,500.00	7.00	$17,500.00	100.00%
26	Permanent Stream Crossing	5.08	1	EA	$17,500.00	$17,500.00	1	$17,500.00		$0.00	1.00	$17,500.00	100.00%
27	Temporary Seeding	6.01	42	AC	$1,300.00	$54,600.00	37	$48,100.00	5.00	$6,500.00	42.00	$54,600.00	100.00%
28	Permanent Seeding	6.02	21	AC	$1,900.00	$39,900.00	21	$39,900.00		$0.00	21.00	$39,900.00	100.00%
29	Live Stakes	6.03	6534	EA	$2.50	$16,335.00	6534	$16,335.00		$0.00	6534.00	$16,335.00	100.00%
30	Bare Root Seedlings	7.03	7085	EA	$2.40	$17,004.00	3985.00	$9,564.00	3100.00	$7,440.00	7085.00	$17,004.00	100.00%
31	Transplant Scoop	7.04	10	EA	$500.00	$5,000.00	3	$1,500.00	7.00	$3,500.00	10.00	$5,000.00	100.00%
32	Containerized Plants (1 gal)	7.05	150	EA	$10.00	$1,500.00	156	$1,560.00	-6.00	-$60.00	150.00	$1,500.00	100.00%
33	Vegetation Plugs	7.05	278	EA	$5.00	$1,390.00	85	$425.00	193.00	$965.00	278.00	$1,390.00	100.00%
34	Signage	8.01	50	EA	$200.00	$10,000.00		$0.00	56.00	$11,200.00	56.00	$11,200.00	112.00%
	TOTALS					**$762,969.00**		**$719,531.60**		**$60,810.00**		**$780,341.60**	

Change Order #4 -Additional Items

Additional survey work to compensate for datum error		$525.00
Additional boundary monuments (3 @ $50.00)		$150.00
	Total	**$675.00**

Amount Certified: **$97,461.57**

By: _____ **Date:** 7-31-12

NET DUE THIS ESTIMATE	$60,810.00
PLUS PREVIOUSLY HELD RETAINAGE	$35,976.58
PLUS CHANGE ORDER #4 ADDITIONAL ITEMS	$675.00
NET DUE	**$97,461.57**
PREVIOUS PAYMENTS	$683,555.03
ORIGINAL CONTRACT AMOUNT	$762,969.00
REVISED CONTRACT AMOUNT	$781,016.60
BALANCE	$0.00

North Carolina
Department of Administration

Beverly Eaves Perdue, Governor
Moses Carey, Jr., Secretary

State Construction Office
Gregory A. Driver, P.E., Director

August 8, 2012

Mr. Edward Hajnos
Capital Projects Coordinator
NC Ecosystem Enhancement Program
Raleigh, NC

Subject: **PROJECT ACCEPTANCE APPROVAL**
NC Department of Environment and Natural Resources
Town of Fletcher Stream Restoration
ID: ***04-06302-01A***

Date of Final Inspection: **06/14/2012**

Dear Mr. Hajnos:

Subsequent to the recent final inspection of the above subject project, this office hereby approves the project contingent upon the completion or correction of all final punch list items (if any), by the responsible contractor(s).

The time limit for completion of the final punch list (if any), shall be in accordance with Article 25 of the General Conditions the Contract or as established by all contractual parties. The designer shall schedule another inspection to verify completion of the final punch list and must notify the State Construction Office and Capital Projects Coordinator, in writing, the status of same. The designer shall also complete documentation for closeout of the project in accordance with the State statute and directives provided in the State Construction Manual. ***Final payment to the designer shall be retained until both record drawings and final report are approved, in writing, by this office. See Article 1-17 of the design agreement.***

Please note that the acceptance date of the project shall be the initiation of contractor(s) warranties. The contractors may at that time cancel coverage for public liability, property damage and Builders Risk Insurance.

If this office can be of additional assistance, do not hesitate to contact us.

Sincerely,

Clyde V. Carl
Building Systems Engineer

CVC/ctm

cc: Mr. Jack Cook – Risk Management Division
Mr. John Cox – State Property Office
Mr. Michael G. Bryant – NC Department of Environment and Natural Resources
Ms. Wyatt Yelverton – HDR Engineering, Inc. of the Carolinas

Mailing Address:
1307 Mail Service Center
Raleigh, NC 27699-1307

Telephone *(919)807-4100*
Fax (919)807-4110
State Courier #56-02-01

Location:
301 N. Wilmington St. Suite 450
Raleigh, North Carolina 27601

Montgomery Insurance
Member of Liberty Mutual Group

Policy Number: IM 1000037	**Prior Policy:**
Policy Period: 04/01/2012 **To:** 10/01/2012 **12:01 am Standard Time at the Mailing Address of the Named Insured**	
Coverage Is Provided In PEERLESS INSURANCE COMPANY - A STOCK COMPANY	
Billing Type: DIRECT BILL - PREPAID	ACCOUNT NUMBER: 501160330
Named Insured and Mailing Address: BUCHANAN AND SONS INC PO BOX 123 WHITTIER NC 28789-0123	**Agent:** BANKERS INSURANCE LLC PO BOX 20 ASHEVILLE NC 28802-0020 **Agent Code:** 2310016 **Agent Phone:** (828)-253-2371

Reason for Amendment: CANCEL PRO RATA

Transaction Effective Date: 07/04/2012

Premium for this Transaction: $ 300.00 CR

STATEMENT OF ACCOUNT

Acct Date	Premium	Commission Percent	Surcharge/ Assessment	Commission Percent	Total Due
07/2012	$ 293.00 CR	20.00%	$ 0.00	0.00%	
07/2012	$ 7.00 CR	20.00%			$ 300.00 CR
				Total Premium Charged:	$ 300.00 CR

Date Issued: 07/11/2012

17-80 (04/97)

AGENT COPY