FINAL

AS-BUILT BASELINE MONITORING REPORT
MARTIN'S CREEK II MITIGATION PROJECT

Cherokee County, North Carolina
EEP Project No. 92633 (Contract No. 005717)
USACE Action ID No. SAW – 2009-00209/DWR Project No. 10-0952
SCO No. 08-07251-01

Data Collection – March-April 2014

Hiwassee River Basin
Cataloging Unit 06020002170010

SUBMITTED TO/PREPARED FOR:

North Carolina Department of Environment and Natural Resources
Ecosystem Enhancement Program
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Raleigh, North Carolina 27603

SUBMITTED BY:

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MAY 2014

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APPENDICES

1.0 PROJECT SUMMARY

The North Carolina Ecosystem Enhancement Program (EEP) has established the Martin's Creek II Mitigation Project (Site) located in Cherokee County, just south of the town of Murphy. The Site includes a 93.87-acre easement encompassed within 14-digit Cataloging Unit 06020002170010 of the Hiwassee River Basin (Figure 1, Appendix B and Table 4, Appendix A). Land use at the Site, prior to mitigation activities, was composed of livestock pasture, open land, a residence, and forested areas. Martin's Creek and its tributaries had been impaired by historical and current land management practices, which include timber harvesting, pasture conversion, channelization, and livestock grazing. Completed project activities, reporting history, completion dates, project contacts, and project attributes are summarized in Tables 1-4 (Appendix A).

The Site is located along Martin's Creek and several unnamed tributaries, which has been assigned Stream Index Number 1-49 and Best Usage Classification of C. Site streams are listed on the NCDWQ draft 2014 and final 2012 Section 303(d) list of impaired streams due to a fair bioclassification for ecological/biological integrity and fish communities, and elevated levels of fecal coliform bacteria. The Site is located within a Targeted Local Watershed that has been identified for stream and buffer restoration opportunities (NCEEP 2008).

The Site lies within the focus area of the *Peachtree-Martins Creek Local Watershed Plan* (LWP) and roughly corresponds to Restoration site #1 & Preservation site #1 of the LWP project atlas (NCEEP 2007). Goals of the LWP include implementation of wetland and stream restoration projects that reduce sources of sediment and nutrients by restoring riparian buffers, stabilizing stream banks, and restoring natural channel geomorphology, particularly in headwater streams.

The project goals will directly address stressors identified in the Peachtree-Martins Creek LWP, namely lack of riparian vegetation, channel modification, excess sediment inputs, excess nutrient inputs, and bacterial contamination as follows.

- Restore geomorphically stable stream channels within the Site;
- Restoration or enhancement of wetlands onsite;
- Exclude livestock from accessing project streams, wetlands, and riparian zones;
- Improve and restore hydrologic connections and achieve uplift of ecosystem functions;
- Improve water quality within the Site through reduction of bank erosion, improved nutrient and sediment removal, and stabilization of streambanks;
- The restoration and preservation of headwater tributaries to the Peachtree-Martins Creek Watershed and the Hiwassee River; and
- Improve aquatic and terrestrial habitat through improved substrate and in-stream cover, addition of woody debris, reduction of water temperature, and restoration of riparian habitat.

The Site mitigation plan was completed in March 2010 with the final design and construction plans completed in November 2010 (Table 2, Appendix A). Project construction was completed between October 2012-July 2013. The implemented mitigation is as follows (Figure 2, Appendix B and Table 1, Appendix A).

- 8817 Stream Mitigation Units
    - Restoring approximately 3486 linear feet of stream channel through construction of stable channel at the historic floodplain elevation.

    - Enhancing (level I) approximately 832 linear feet of stream channel through cessation of current land use practices, installing grade control structures, repairing bank erosion, restoring proper channel dimension, and planting with native forest vegetation.
    - Enhancing (level II) approximately 1903 linear feet of stream channel through cessation of current land use practices, removing invasive species, and planting with native forest vegetation.
    - Preserving 21,327 linear feet of stream channel.
- 5.97 Riparian Wetland Mitigation Units
    - Restoring approximately 5.20 acres of riparian wetland by removing spoil castings, restoring stream inverts to historic elevations rehydrating stream-side wetlands, removing drain tile, eliminating land use practices, and planting with native forest vegetation.
    - Enhancing approximately 1.61 acres of riparian wetland by fencing livestock and supplemental planting.
- Planting a native woody riparian buffer (at least 30 feet in width) adjacent to restored/enhanced streams and wetlands within the Site.
- Protecting the Site in perpetuity with a conservation easement.

Stream Success Criteria

Stream restoration success criteria for the Site are based on the *Stream Mitigation Guidelines* issued in April 2003 by the USACE and NCDWQ. Success criteria for stream restoration will include 1) documentation of two bankfull events, 2) little change in the channel cross-section from as-built conditions, 3) stable longitudinal profile, 4) substrate consistency, and 5) photographic evidence of stability.

Bankfull Events

Two bankfull flow events in separate years must be documented within the 5-year monitoring period. Otherwise, the stream monitoring will continue until two bankfull events have been documented in separate years.

Cross-sections

Riffle cross-sections on the restoration and enhancement reaches should be stable and should show little change in bankfull area, maximum depth ratio, and width-to-depth ratio. Riffle cross-sections should generally fall within the parameters defined for channels of the appropriate Rosgen stream type. If any changes do occur, these changes will be evaluated to assess whether the stream channel is showing signs of instability. Indicators of instability include a vertically incising thalweg or eroding channel banks. Changes in the channel that indicate a movement toward stability or enhanced habitat include a decrease in the width-to-depth ratio in meandering channels or an increase in pool depth.

Longitudinal Profile

Longitudinal profile data for the stream reach should show that bedform features are remaining stable. The riffles should be steeper and shallower than the pools, while the pools should be deep with flat water surface slopes. The relative percentage of riffles and pools should not change significantly from the design parameters.

Bed Material Analysis

Substrate materials in restoration reaches should indicate a progression towards or the maintenance of coarser materials in the riffle features and smaller particles in the pool features.

Photo Reference Sites

Photographs will be used to evaluate channel aggradation or degradation, bank erosion, success of riparian vegetation, and effectiveness of erosion control measures subjectively. Lateral photos should not indicate excessive erosion or continuing degradation of the banks. A series of photos over time should indicate successive maturation of riparian vegetation.

Vegetation Success Criteria

Success criteria have been established to verify that the vegetation component supports community elements necessary for forest development. Success criteria for this project includes an average density of 320 planted stems per acre must be surviving in the first three monitoring years. Subsequently, 290 planted stems per acre must be surviving in year 4, and 260 planted stems per acre in year 5.

Wetland Success Criteria

Hydrologic success will be based on conditions of on-site reference wetlands. Success will be determined by the following criteria.

Years One Through Three

Hydrologic success criteria will be met if the Site demonstrates groundwater table levels within 12 inches of the soil surface for a minimum of 13% of the growing season (this criterion reflects a deviation of 50% from the duration of saturation expected for this type of wetland system (~25%). Success for monitoring years one through three will be determined based on this 50% tolerance of deviation from the duration of wetland hydrology at the reference sites.

Years Four and Five

Success for monitoring years four and five will be determined based on a 20% tolerance of deviation from the duration of wetland hydrology at the reference sites. Therefore, it is expected that in years four and five the site will achieve a minimum of 20% saturation. Based on reference conditions and the criterion stated above, it is expected that reference soil saturation for years one through five will continue to exceed the regulatory 12.5% minimum requirement of the growing season for Cherokee County. In order to attain conditions suitable for the formation of wetland vegetation and hydric soils, the Site should be saturated within 12 inches of the surface or inundated for consecutive period equal to 24 days. However, to meet hydrologic success criteria and mimic the reference wetland hydrology, the site should demonstrate wetland hydrology for a minimum of 25 days in years one through three. In years four and five, this will increase to a minimum of 38 days. Overbank flooding from the adjacent channel will also be noted during monitoring.

Reference areas will be monitored for a minimum of five years.

2.0 METHODOLOGY

Monitoring of the Site's restoration efforts will be performed until agreed upon success criteria are fulfilled. Monitoring is proposed for the stream channel, riparian vegetation, and hydrology for a period of five years (Figures 2 & 2A-2C, Appendix A). Monitoring reports of collected data will be submitted no later than December of each monitoring year.

2.1 Streams

Post-restoration monitoring will be conducted for five years following the completion of construction to evaluate the effectiveness of the restoration practices. Monitored stream parameters include stream

dimension (cross-sections), pattern (longitudinal survey), profile (profile survey), and photographic documentation. Baseline stream data can be found in Appendix D.

Bankfull Events

The occurrence of bankfull events within the monitoring period will be documented by the use of a crest gauge and photographs. One crest gauge was installed to record the highest watermark between site visits; the gauge will be checked each Site visit to determine if a bankfull event has occurred (Figure 2A, Appendix B). Photographs will be used to document the occurrence of debris lines and sediment deposition on the floodplain during monitoring site visits.

Cross-sections

A total of 19 permanent cross-sections, 12 riffle and 7 pool, were established and will be used to evaluate stream dimension; locations are depicted on Figures 2, 2A, and 2B (Appendix B) Because riffle cross-sections are critical in determining bankfull design parameters, the number of riffle cross-sections established will generally outnumber pool cross-sections. Each cross-section will be marked on both banks with permanent pins to establish the exact transect used. A common benchmark will be used for cross-sections and consistently used to facilitate easy comparison of year-to-year data. The annual cross-section survey will include points measured at all breaks in slope, including top of bank, bankfull, inner berm, edge of water, and thalweg, if the features are present. Riffle cross sections will be classified using the Rosgen Stream Classification System.

Longitudinal Profile

After Site construction, approximately 4493 linear feet of longitudinal profile was completed to document baseline conditions. Longitudinal profile will be resurveyed annually for the duration of the five-year monitoring period. Measurements include thalweg, water surface, bankfull, and top of low bank. Each of these measurements will be taken at the head of each channel unit (e.g., riffle, pool) and at the maximum pool depth. The survey will be tied to a permanent benchmark.

Bed Material Analysis

Pebble counts will be conducted annually on one permanent riffle cross-section (100-counts) at the time cross-section and longitudinal surveys are performed during the five year monitoring period. These samples will reveal changes in sediment gradation over time as the stream adjusts to upstream sediment loads.

Photo Reference Sites

A total of 26 photographs will be used to visually document restoration success for at least five years following construction. Photographs will be taken from a height of approximately five to six feet. Photo locations will be recorded using sub-meter GPS to ensure that the same locations (and view directions) on the Site are monitored in each monitoring period.

2.2 Vegetation

After planting was completed, an initial evaluation was performed to verify planting methods were successful and to determine initial species composition and density. Fifteen sample vegetation plots (10-meter by 10-meter) were installed and measured within the Site as per guidelines established in *CVS-EEP Protocol for Recording Vegetation, Version 4.2* (Lee et al. 2008). Vegetation plots are permanently monumented with 6-foot metal t-posts at each corner. In each sample plot, vegetation parameters to be monitored include species composition and species density. Visual observations of the percent cover of

shrub and herbaceous species will also be documented by photograph. Baseline vegetation plot information can be found in Appendix C. Initial stem count measurements indicate an average of 362 planted stems per acre (excluding livestakes) across the Site.

2.3 Wetland Hydrology

Thirteen groundwater monitoring gauges were installed within Site wetland restoration areas to monitor groundwater hydrology (Figure 2A, Appendix A). Hydrological sampling will continue for five years throughout the growing season at intervals necessary to satisfy hydrology success criteria. In addition, an on-site rain gauge will document rainfall data for comparison of groundwater conditions with extended drought conditions. Finally, groundwater gauges located within riverine wetlands adjacent to restored stream reaches will supplement crest gauge measurements to confirm overbank flooding events.

3.0 REFERENCES

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United States Geological Survey (USGS). 1974. Hydrologic Unit Map - 1974. State of North Carolina.

Appendix A.
Background Tables

Table 1. Project Components and Mitigation Units
Table 2. Project Activity and Reporting History
Table 3. Project Contacts Table
Table 4. Project Attributes Table

Table 1. Project Components and Mitigation Credits
Martin's Creek II Mitigation Site

Mitigation Credit Summations							
Stream			**Riparian Wetland**				**Nonriparian Wetland**
8817			**5.97**				**---**
Projects Components							
Station Range		**Existing Linear Footage/Acreage**	**Priority Approach**	**Restoration/ Restoration Equivalent**	**Restoration Linear Footage/Acreage**	**Mitigation Ratio**	**Mitigation Credits**	**Comment**
Right Prong Martin's Creek and UTs		17,234	---	Preservation	17,234-203= 17,031	5:1	3406.2	Three short reaches in upstream portion of RP UT1 do not have adequate buffer to claim credit and therefore have been removed from the total linear footage and calculated mitigation credits.
Right Prong Martin 's Creek and UTs		971	---	Enhance II	971	2.5:1	388.4	Enhancement Level II - invasive species controls and localized erosion stabilization.
Martin's Creek UTs		4296	---	Preservation	4296	5:1	859.2	
Martin's Creek*		857	---	Enhance II	857	5:1*	171.4	Enhancement Level II - invasive species controls and localized erosion stabilization.
UT-2 to Martin's Creek		75	---	Enhance II	75	2.5:1	30.0	
UT 1 (Reach 3) to Martin's Creek Station 00+00 to 03+37		337	---	Enhance I	337	1.5:1	224.7	Level I stream enhancement - grade control structures, repair bank erosion, and restore proper dimension.
UT 1-3 (Reach 1) to Martin's Creek Station 00+00 to 04+95		495	---	Enhance I	495	1.5:1	330.0	Level I stream enhancement - grade control structures, repair bank erosion, and restore proper dimension.
UT 1 (Reach 2) to Martin's Creek Station 00+00 to 10+52		1052	I	Restoration	1052	1:1	1052	Construction of a new channel on the existing floodplain.
UT 1 (Reach 4) to Martin's Creek	05+46 to 05+91	332	II	Restoration	51	1:1	51.0	Construction of a new channel in a low slope valley.
	05+91 to 06+35**				37	2:1**	18.5	
	06+35 to 15+75				941	1:1	941.0	
	15+75 to 16+75**				100	2:1**	50.0	
UT 1-3 (Reach 2) to Martin's Creek	05+54 to 05+90	1068	II	Restoration	35	1:1	35.0	Construction of a new channel in a low slope valley.
	05+90 to 06+10***				20	2:1***	10.0	
	06+10 to 18+59				1250	1:1	1250.0	
Wetland Restoration		---	---	Restoration	5.14	1:1	5.14	Restoration of riparian wetlands through stream restoration activities, filling abandoned channels and drain tiles, removing spoil castings, and planting.
					0.06	2:1^	0.03	
Wetland Enhancement		1.61	---	Enhancement	1.604	2:1	0.802	Enhancement of existing riparian wetlands by fencing livestock and planting.
					0.006	4:1[+]	0.002	

Component Summation			
Restoration Level	**Stream (linear footage)**	**Riparian Wetland (acreage)**	**Nonriparian Wetland (acreage)**
Restoration	3486	5.22	--
Enhancement (Level I)	832	--	--
Enhancement (Level II)	1903	1.61	--
Preservation	21,327	--	
Totals	**27,548**	**6.81**	--
Mitigation Units	**8817 SMUs**	**5.97 Riparian WMUs**	**0.00 Nonriparian WMUs**

* Martin's Creek proper is located beneath a power line; therefore, a credit ratio of 5:1 has been used to calculate mitigation units.
** UT1 (Reach 4) stations 05+91 to 06+35 and 15+75 to 16+75 are located beneath a power line; therefore, a credit ratio of 2:1 has been used to calculate mitigation units.
*** UT1-3 (Reach 2) station 05+90 to 06+10 is located beneath a power line; therefore, a credit ratio of 2:1 has been used to calculate mitigation units.
^0.06 acres of wetland restoration is located beneath a power line; therefore, a credit ratio of 2:1 has been used to calculate mitigation units.
[+]0.006 acres of wetland enhancement is located beneath a power line; therefore, a credit ratio of 4:1 has been used to calculate mitigation units.

Table 2. Project Activity and Reporting History
Martin's Creek II Mitigation Site

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Mitigation Plan	January 2010-July 2010	September 2010
Final Design – Construction Plans	September 2010-March 2011	March 2011
Construction	--	October 2012-July 2013
Temporary S&E Mix applied to Entire Project Site	--	October 2012-July 2013
Permanent Seed Mix applied to the Entire Project Site	--	October 2012-July 2013
Bare Root; Containerized; and B&B Plantings for the Entire Project Site	--	March 2014
Mitigation Plan/ As-Built (Year 0 Monitoring Baseline)	March-April 2014	April 2014
Year 1 Monitoring		
Year 2 Monitoring		
Year 3 Monitoring		
Year 4 Monitoring		
Year 5 Monitoring		

Table 3. Project Contacts Table
Martin's Creek II Mitigation Site

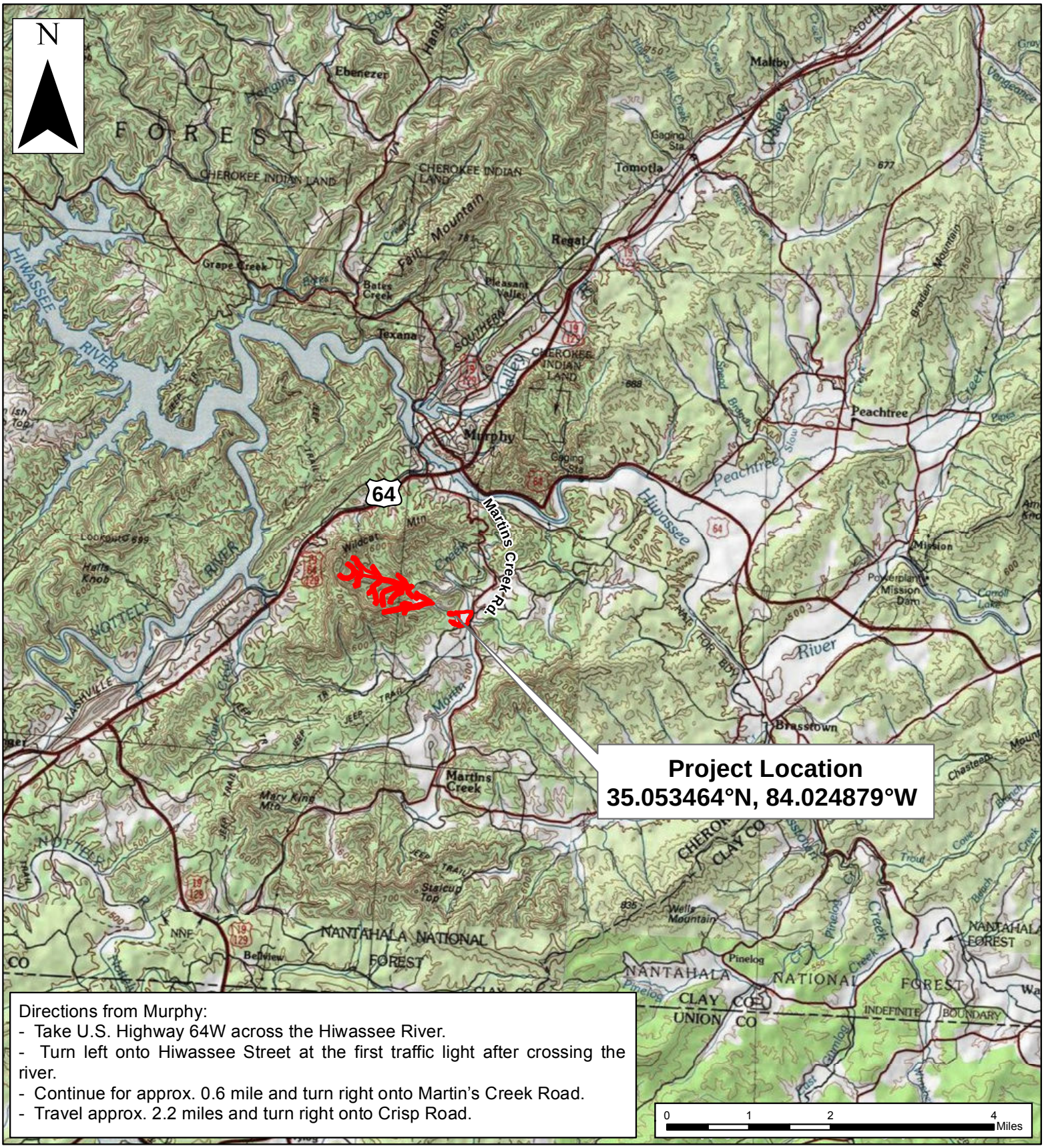
Designer	Michael Baker Engineering, Inc. 797 Haywood Road, Suite 201 Asheville, NC 28806 Micky Clemmons 828-350-1408
Construction Plans and Sediment and Erosion Control Plans	Michael Baker Engineering, Inc. 797 Haywood Road, Suite 201 Asheville, NC 28806 Micky Clemmons 828-350-1408
Construction Contractor	River Works, Inc. 6105 Chapel Hill Rd. Raleigh, NC 27607 919-582-3574
Planting Contractor	Carolina Silvics, Inc. 908 Indian Trail Road Edenton, NC 27932 (252) 482-8491
As-built Surveyor	Turner Land Surveying. PLLC 3201 Glenridge Drive Raleigh, NC 27604 919-875-1378
Baseline Data Collection	Axiom Environmental, Inc. 218 Snow Avenue Raleigh, NC 27603 Grant Lewis 919-215-1693

Table 4. Project Attribute Table
Martin's Creek II Mitigation Site

Project County	Cherokee County, North Carolina							
Physiographic Region	Blue Ridge							
Ecoregion	Broad Basins							
Project River Basin	Hiwassee							
USGS HUC for Project (14 digit)	06020002170010							
NCDWQ Sub-basin for Project	04-05-02							
Planning Area	Yes – Peachtree-Martins Creek LWP							
WRC Class (Warm, Cool, Cold)	Cold							
% of project easement fenced or demarcated	100							
Beaver activity observed during design phase?	No							
	Right Prong Martin's Creek		Martin's Creek					
	RP UT1	RP Mainstem	MC UT1		MC UT1-3		MC UT2	MC Mainstem
			LII Enh	PI Rest	LI Enh	PI Rest		
Drainage Area	.17	0.6	0.02 – 0.18		0.07 – 0.08		0.39	6.81
Stream Order (USGS topo)	1st	3rd	2nd		1st		1st	3rd
Restored Length (feet)								
Perennial or Intermittent	I/P	I/P	P	P	P	P	P	P
Watershed Type	Rural							
Watershed impervious cover	<10%							
NCDWQ AU/Index number	1-49 (Martin's Creek), 1-49-3 (Right Prong Martins Creek)							
NCDWQ Classification	C		C		C		C	C
303d listed?	No							
Upstream of a 303d listed	No							
Reasons for 303d listed segment	NA							
Total acreage of easement	93.87							
Total existing vegetated acreage of easement	-							
Total planted restoration acreage	17 acres							
Rosgen Classification of preexisting	B	B	Eb/Fb/B/G	Cb/G	Eb/B	C/F	B	C
Rosgen Classification of As-built	B	B	B/C	B/C	B	C	B	C
Valley type	II		II		VIII		VIII	VIII
Valley slope	N/A		0.015 - 0.05		0.007 – 0.04		N/A	N/A
Cowardin classification of proposed	N/A		N/A		N/A		N/A	N/A
Trout waters designation	No							
Species of concern, endangered etc.	No							
Dominant Soil Series	Cullowhee fine sandy loam		Thurmont-Dillard Complex Arkaqua loam		Dillard loam Arkaqua loam		Arkaqua loam	Arkaqua loam

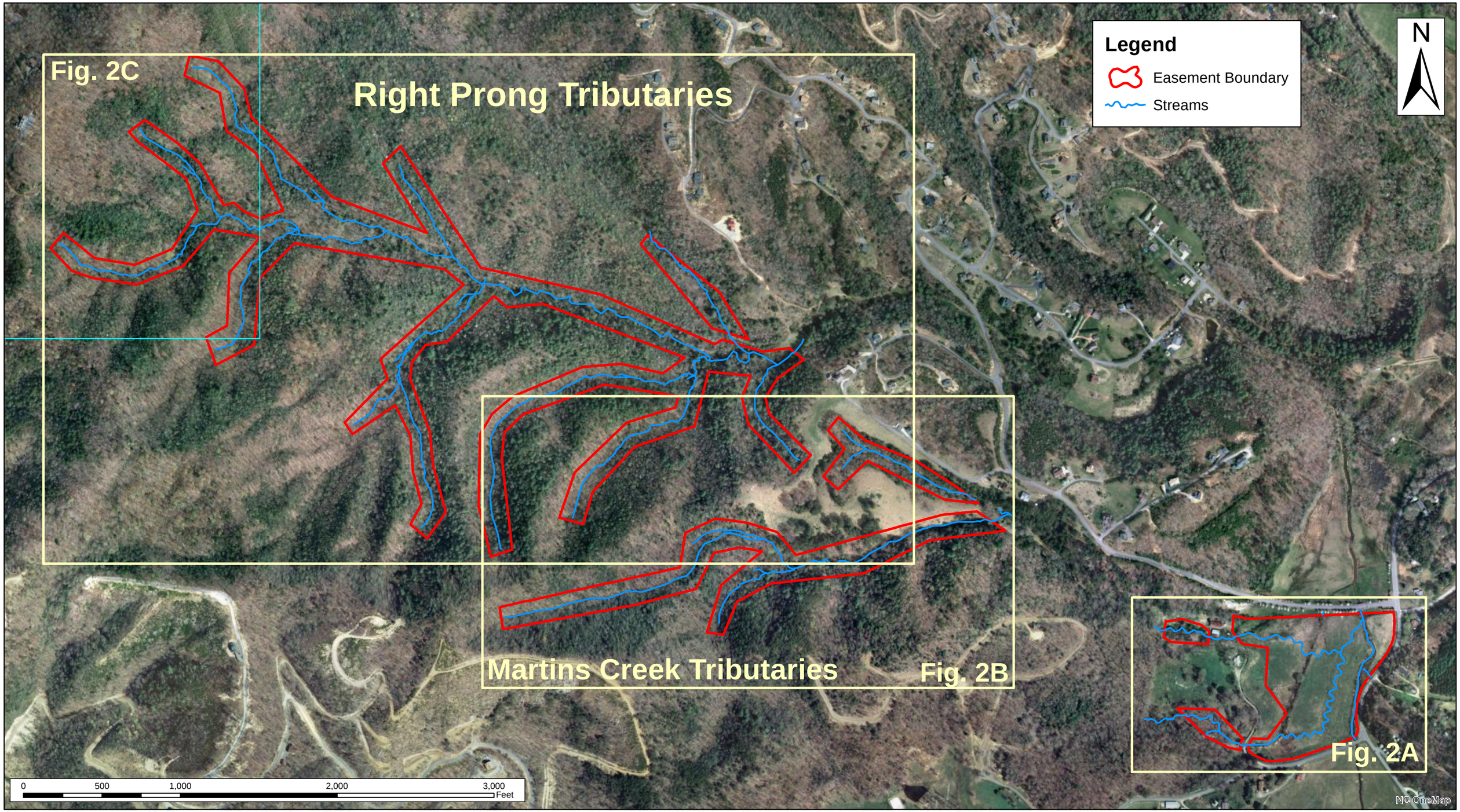
Appendix B
Visual Assessment Data

Figure 1. Vicinity Map
Figures 2 & 2A-2C. Current Conditions Plan View
Figures 3 & 3A-3C. Project Components Map
Stream Fixed Station Photo Points
Vegetation Plot Photographs



Directions from Murphy:
- Take U.S. Highway 64W across the Hiwassee River.
- Turn left onto Hiwassee Street at the first traffic light after crossing the river.
- Continue for approx. 0.6 mile and turn right onto Martin's Creek Road.
- Travel approx. 2.2 miles and turn right onto Crisp Road.

Prepared by:	Prepared for:			
Axiom Environmental, Inc.	Ecosystem Enhancement Program	VICINITY MAP MARTINS CREEK II EEP PROJECT NUMBER 92633 Cherokee County, North Carolina	Dwn. by: KRJ Date: April 2014 Project: 12.004.16	FIGURE 1



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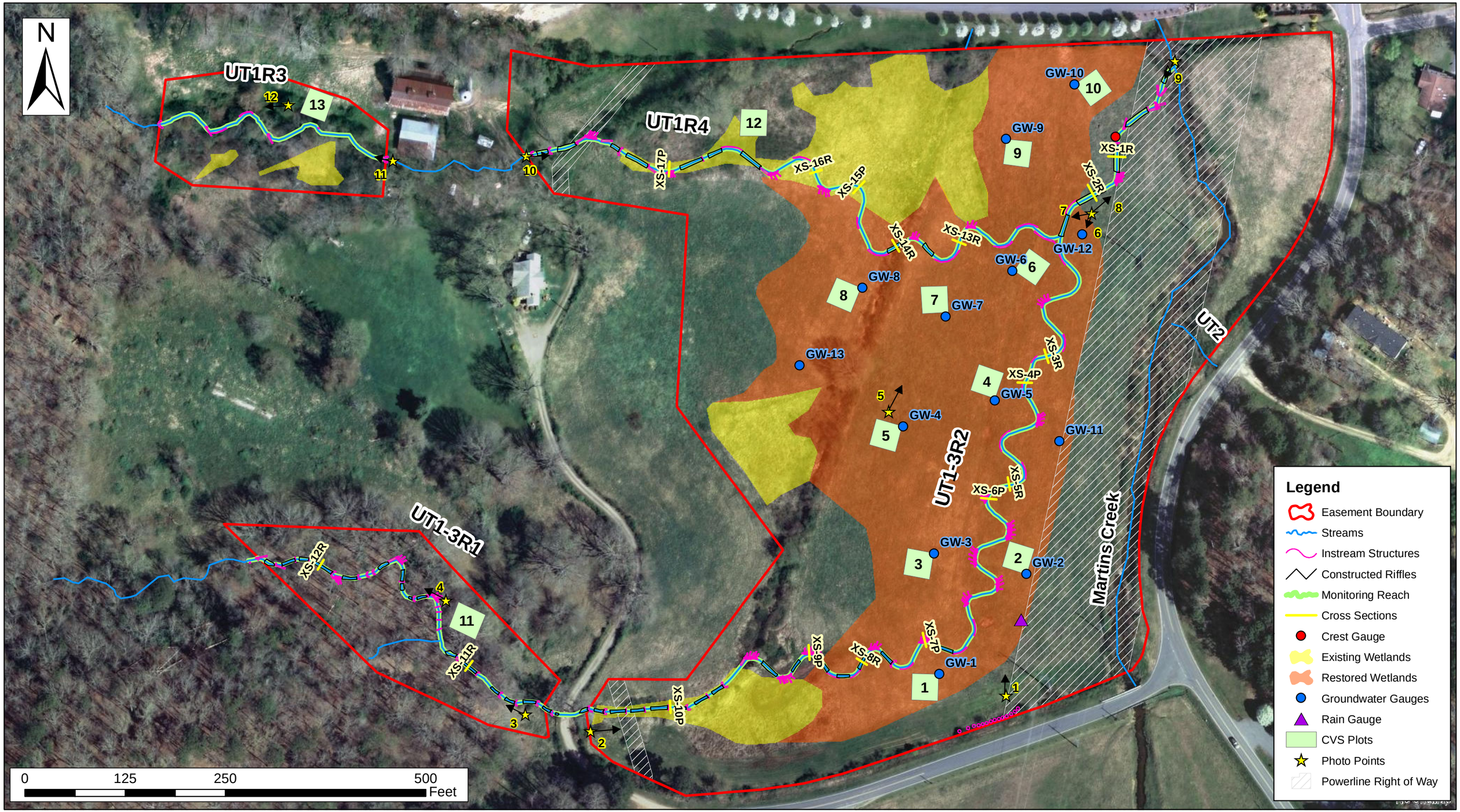
CURRENT CONDITIONS PLAN VIEW
MARTINS CREEK II
EEP PROJECT # 92633
Cherokee County, North Carolina

Dwn. by. KRJ	FIGURE
Date: May 2014	2
Project: 12-004.16	



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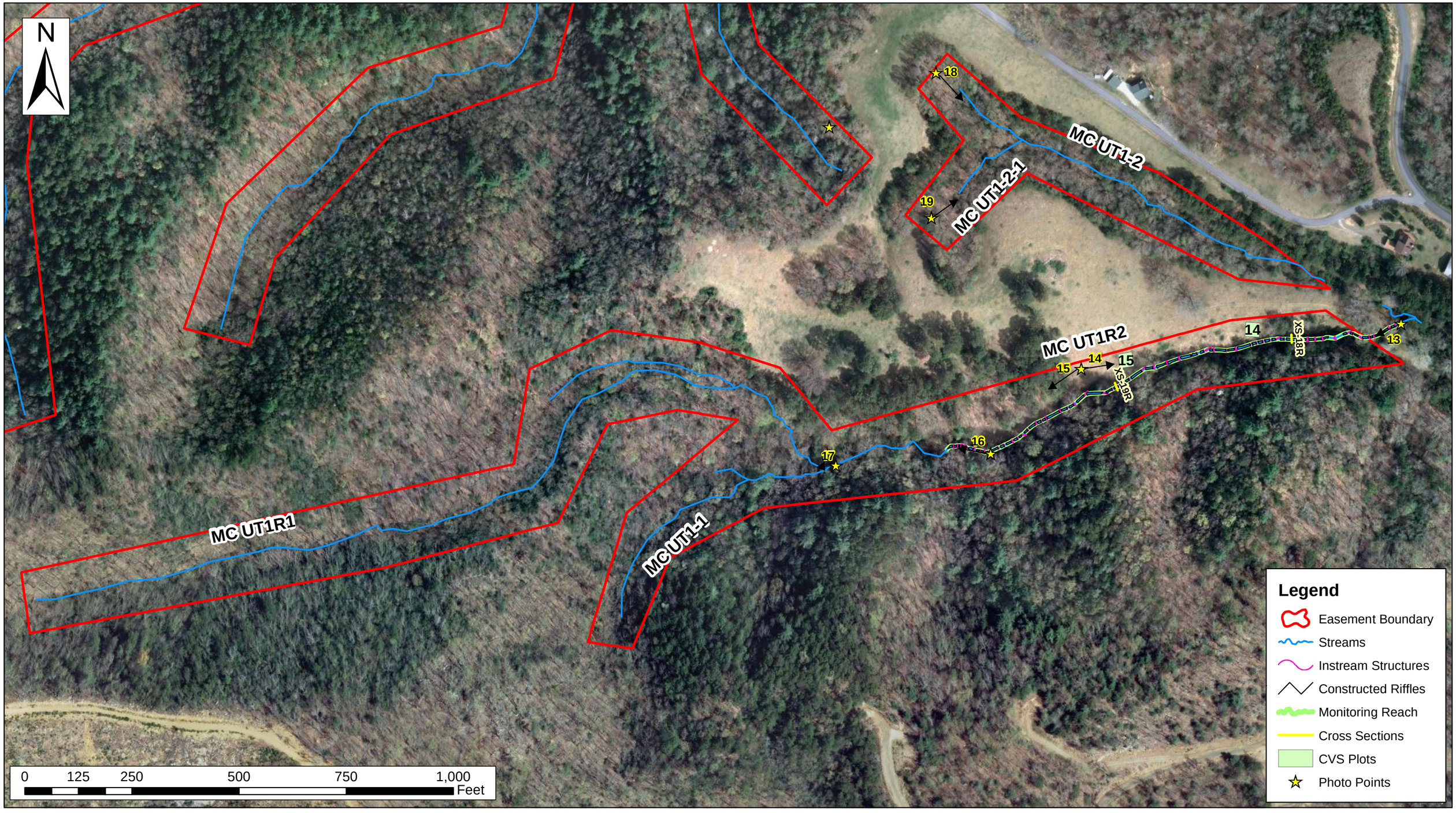
CURRENT CONDITIONS PLAN VIEW
MARTINS CREEK II
EEP PROJECT # 92633
Cherokee County, North Carolina

Dwn. by.	KRJ
Date:	May 2014
Project:	12-004.16
FIGURE	2A



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CURRENT CONDITIONS PLAN VIEW
MARTINS CREEK II (MARTINS CREEK TRIBUTARIES)
EEP PROJECT # 92633
Cherokee County, North Carolina

Dwn. by. KRJ	FIGURE
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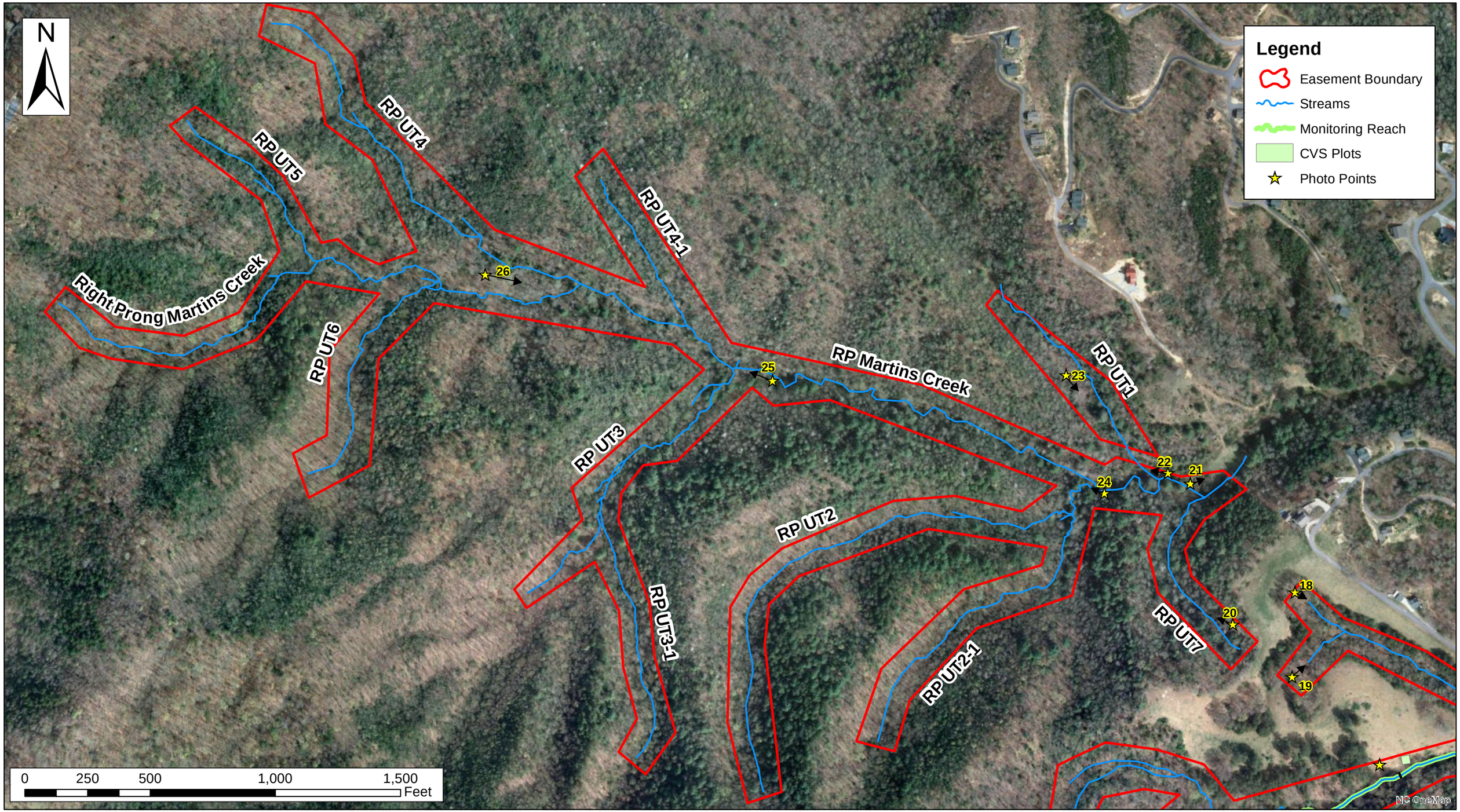
Project: 12-004.16	



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CURRENT CONDITIONS PLAN VIEW
MARTINS CREEK II (RIGHT PRONG TRIBUTARIES)
EEP PROJECT # 92633
Cherokee County, North Carolina

Dwn. by. KRJ	FIGURE 2C
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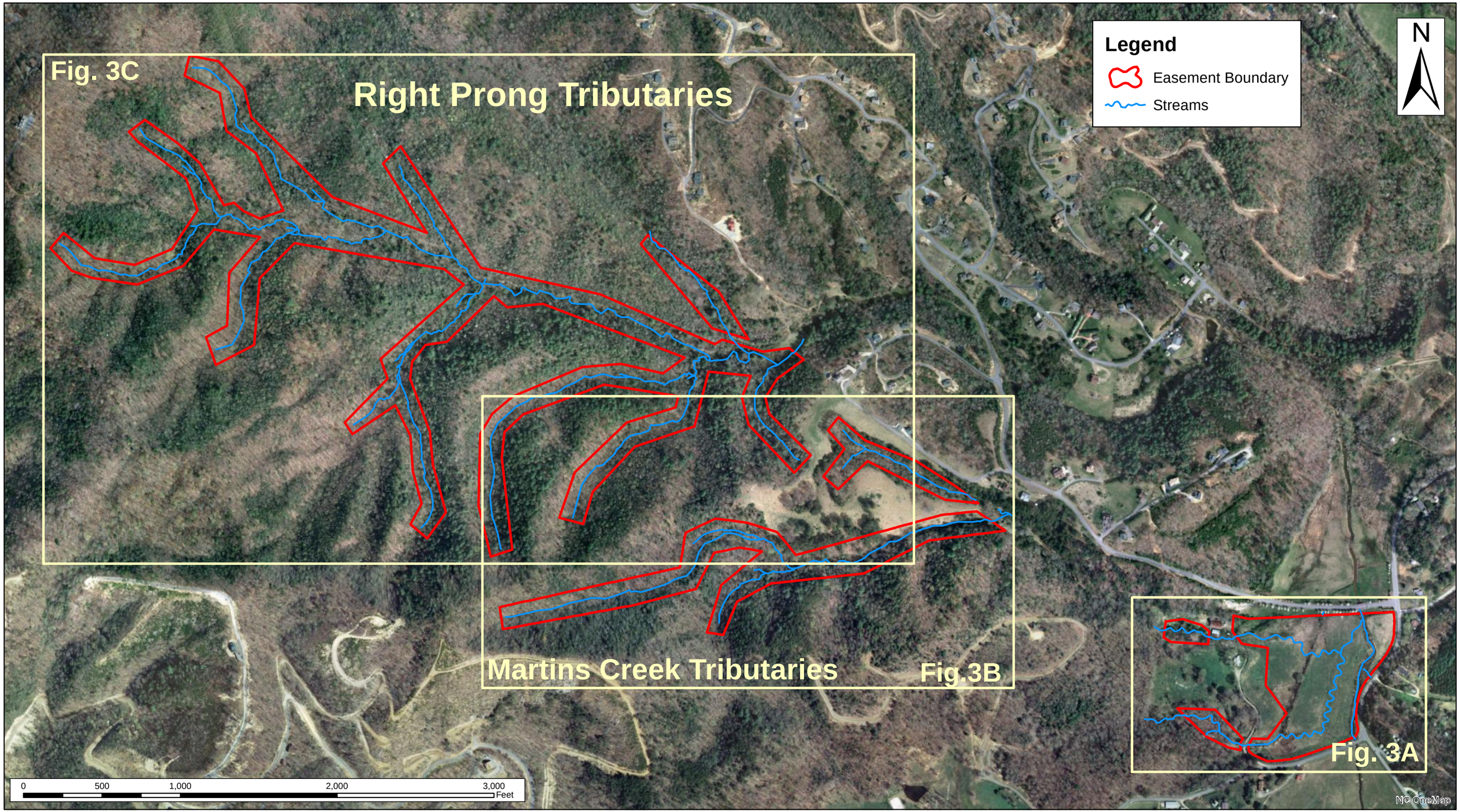
Project: 12-004.16	



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PROJECT COMPONENTS MAP
MARTINS CREEK II
EEP PROJECT # 92633
Cherokee County, North Carolina

Dwn. by. KRJ	FIGURE 3
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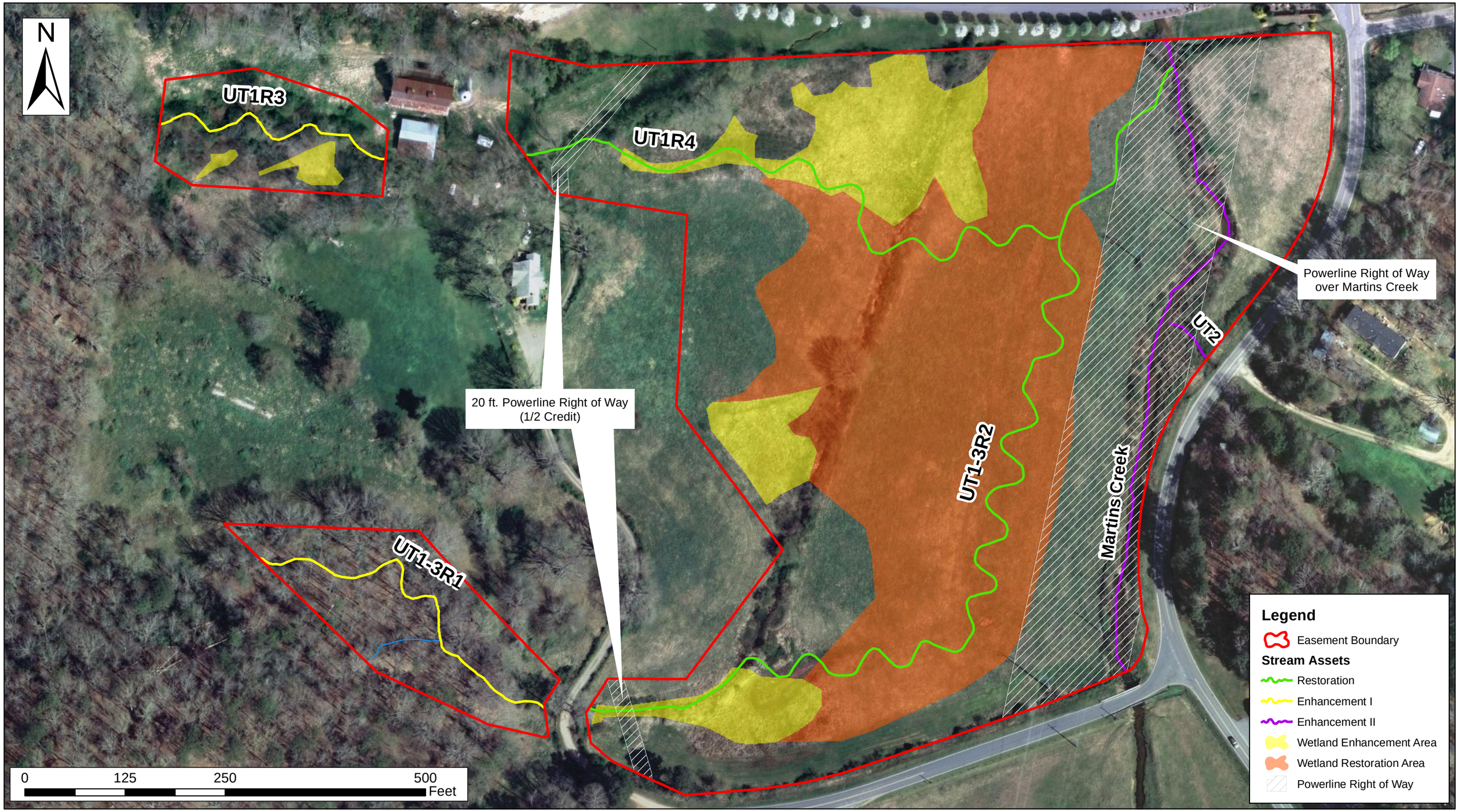
Project: 12-004.16	



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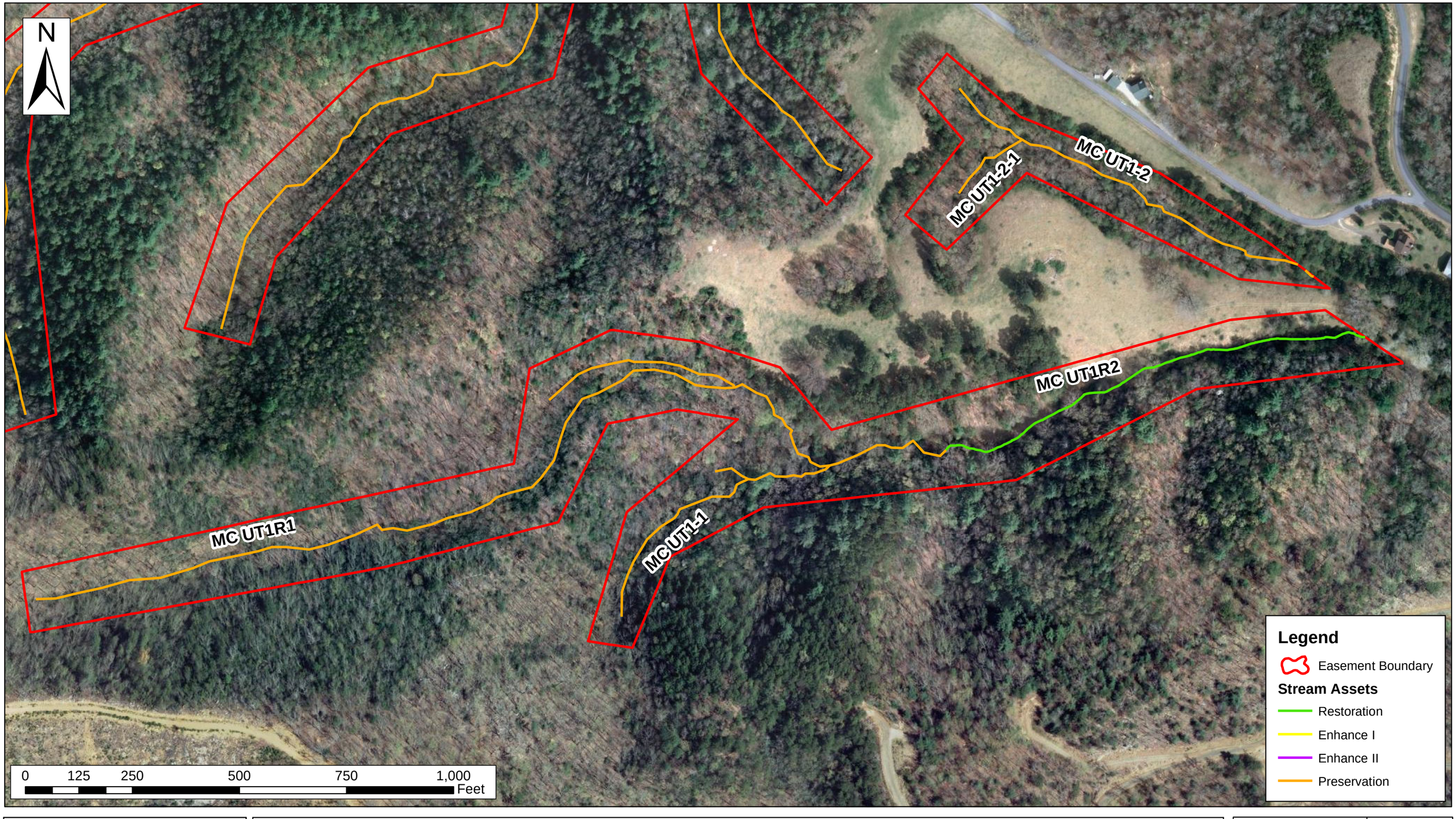
PROJECT COMPONENTS MAP
MARTINS CREEK II
EEP PROJECT # 92633
Cherokee County, North Carolina

Dwn. by. KRJ	FIGURE
Date: May 2014	3A
Project: 12-004.16	



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PROJECT COMPONENTS MAP
MARTINS CREEK II (MARTINS CREEK TRIBUTARIES)
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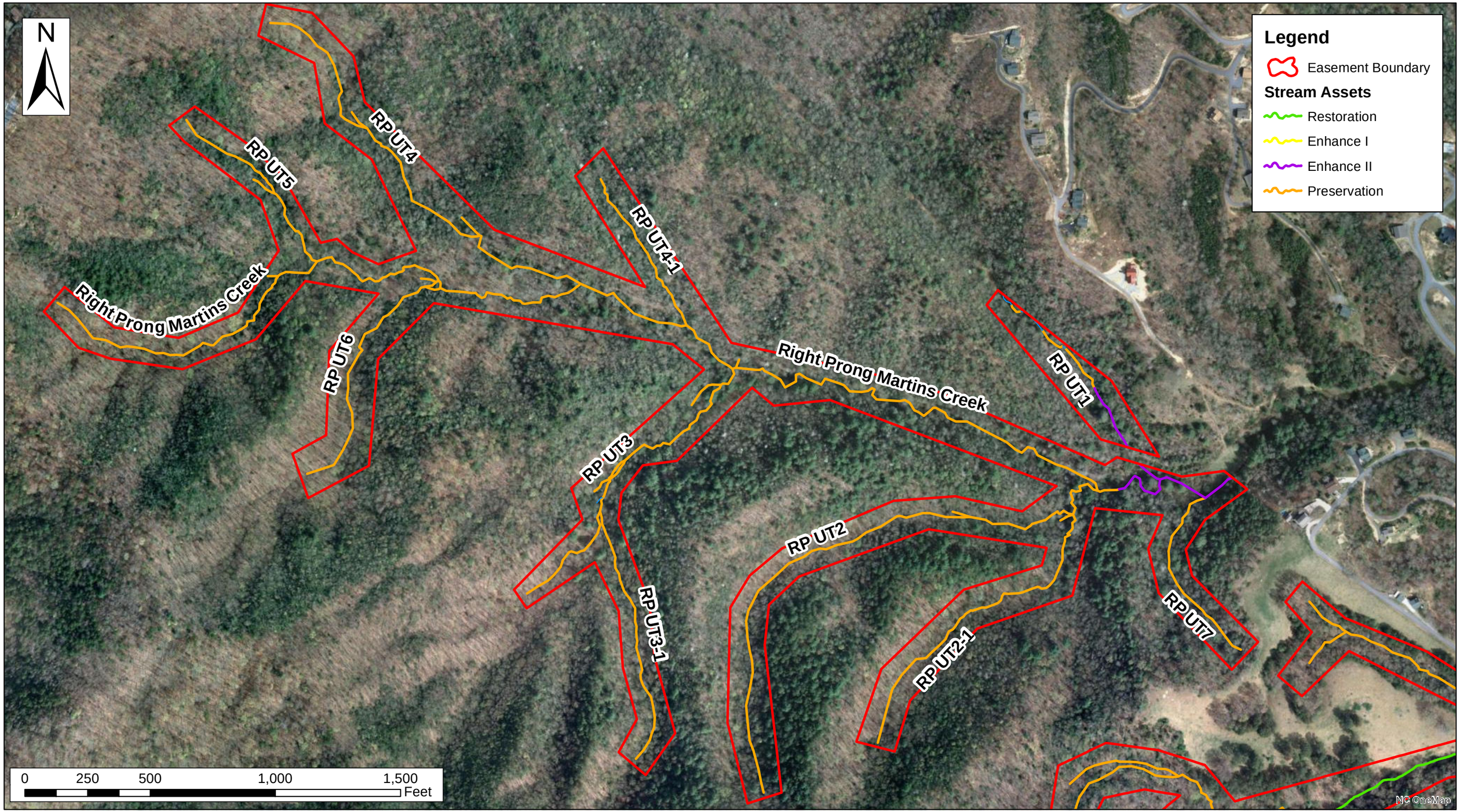
Cherokee County, North Carolina

Dwn. by. KRJ	FIGURE
Date: May 2014	3B
Project: 12-004.16	



Axiom Environmental
218 Snow Avenue
Raleigh, NC 27603
(919) 215-1693
Axiom Environmental, Inc.

PROJECT COMPONENTS MAP
MARTINS CREEK II (RIGHT PRONG TRIBUTARIES)
EEP PROJECT # 92633
Cherokee County, North Carolina

Dwn. by. KRJ	FIGURE 3C
Date: May 2014	
Project: 12-004.16	

Martin's Creek II
Baseline Fixed Station Photographs
Taken April 2014

Photo Point 1

Photo Point 2

Photo Point 3

Photo Point 4

Photo Point 5

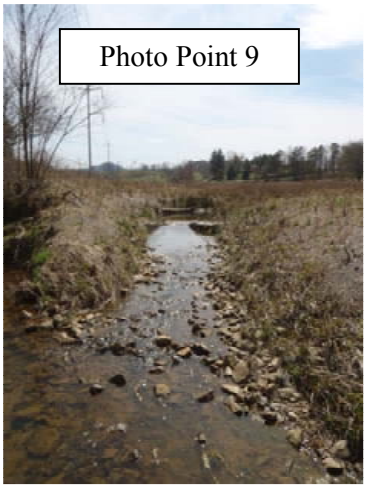
Photo Point 6

Martin's Creek II
Baseline Fixed Station Photographs (continued)
Taken April 2014

Photo Point 7

Photo Point 8

Photo Point 9



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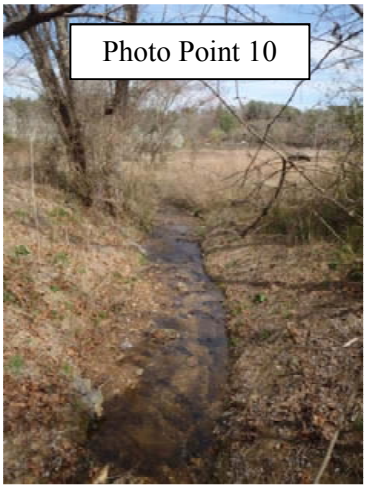

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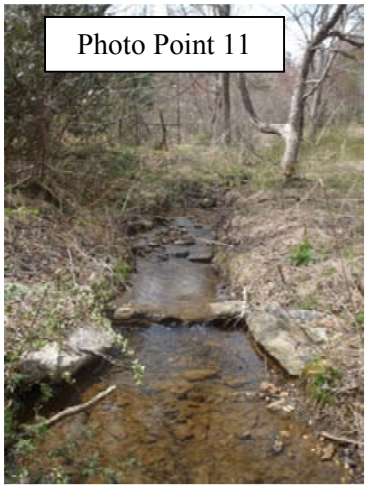


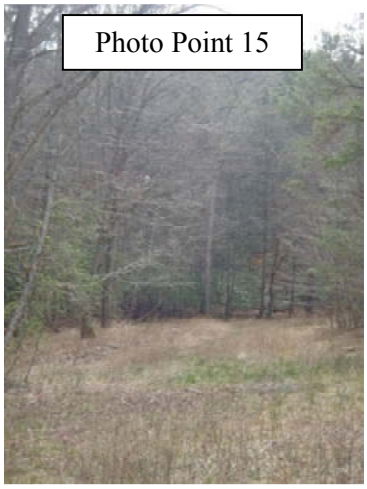
Photo Point 12

Martin's Creek II
Baseline Fixed Station Photographs (continued)
Taken April 2014

Photo Point 13

Photo Point 14

Photo Point 15



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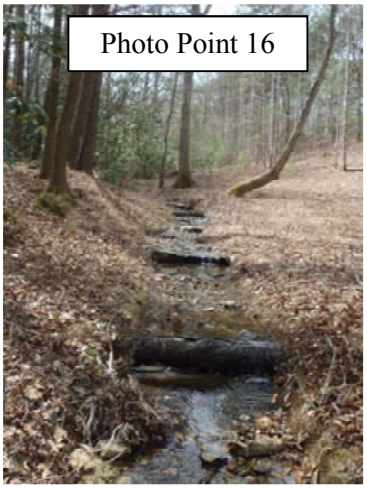


Photo Point 17

Photo Point 18

Martin's Creek II
Baseline Fixed Station Photographs (continued)
Taken April 2014

Photo Point 19

Photo Point 20

Photo Point 21

Photo Point 22

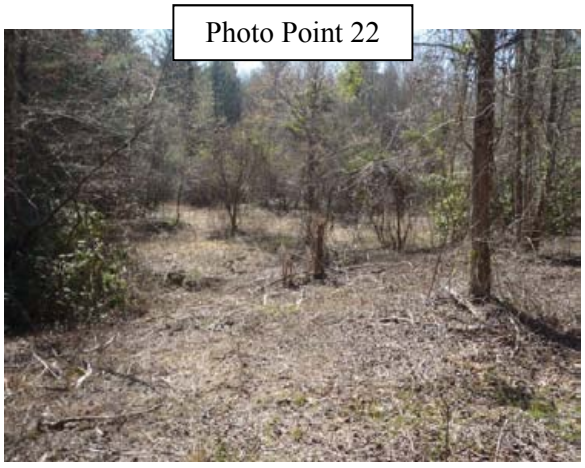


Photo Point 23

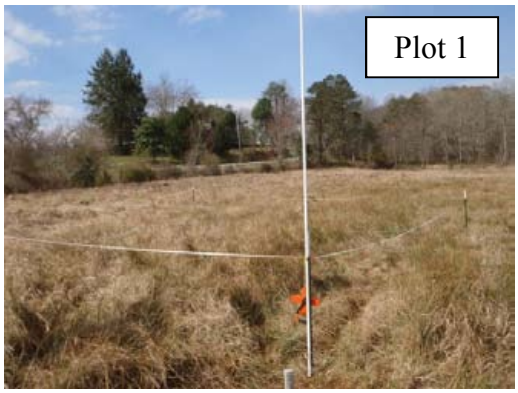
Photo Point 24

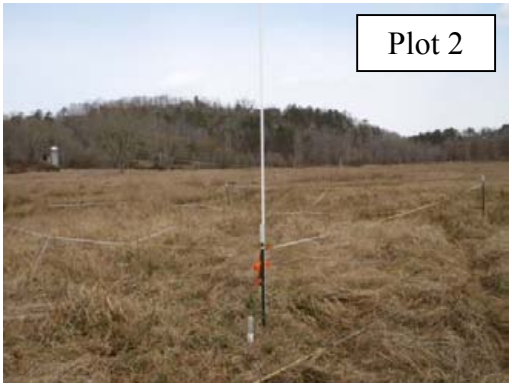
Martin's Creek II
Baseline Fixed Station Photographs (continued)
Taken April 2014

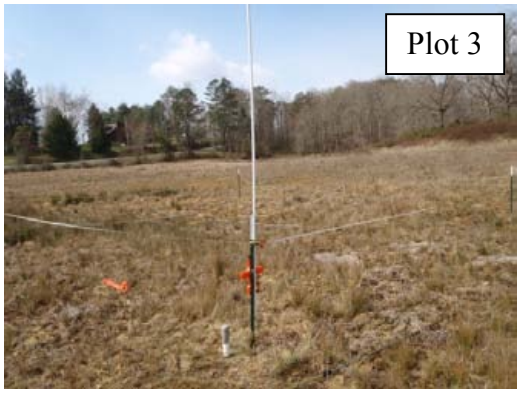
Photo Point 25

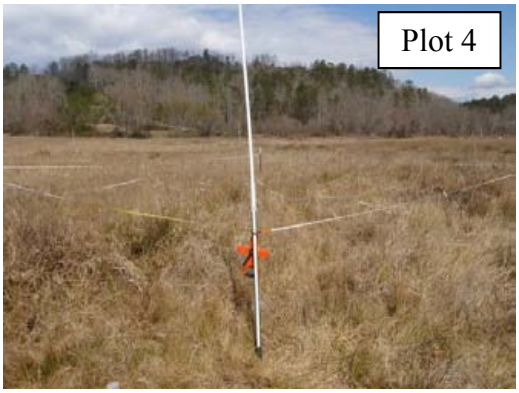
Photo Point 26

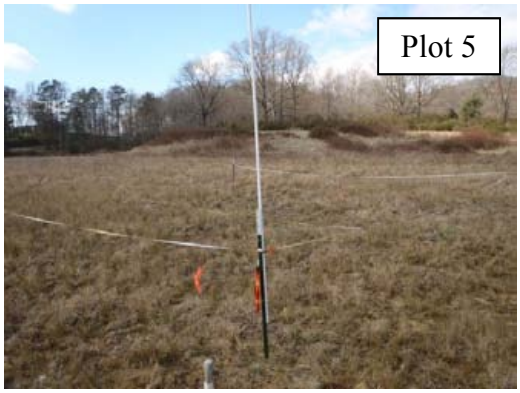
Martin's Creek II
Baseline Vegetation Monitoring Photographs
Taken March 25, 2014

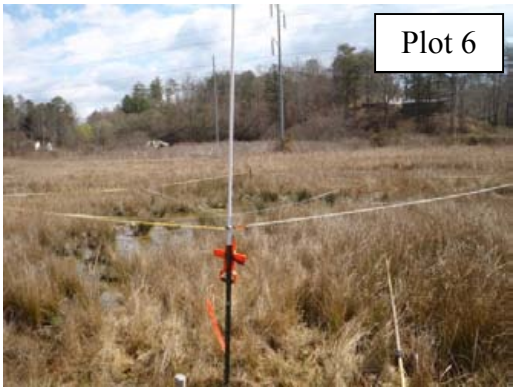




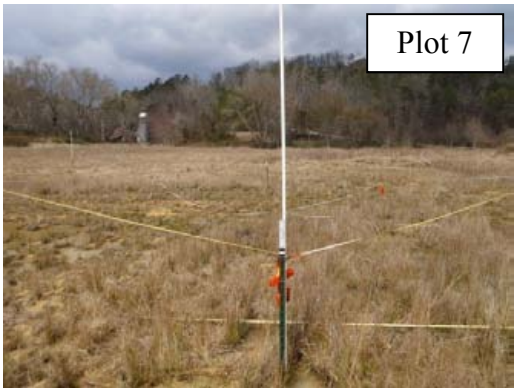


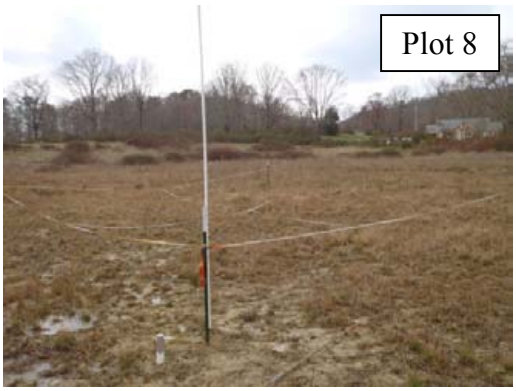


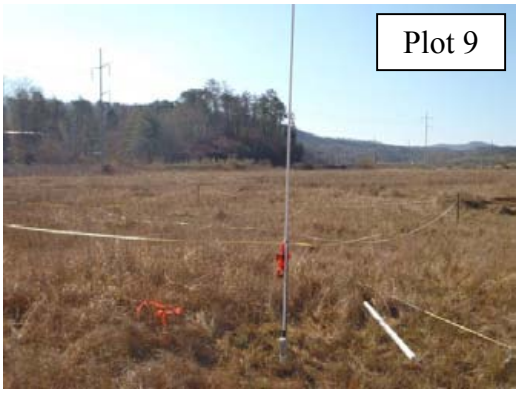


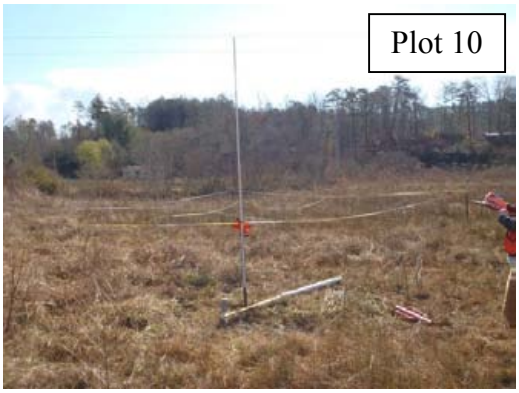


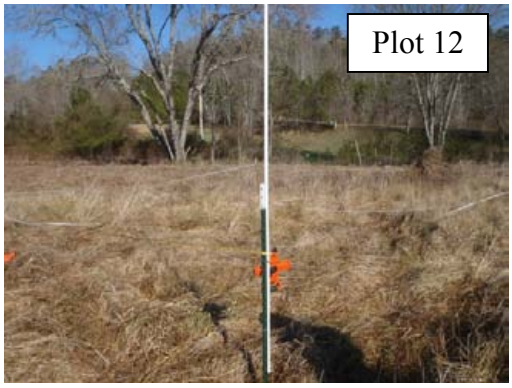
Martin's Creek II
Baseline Vegetation Monitoring Photographs
Taken March 25, 2014
(continued)



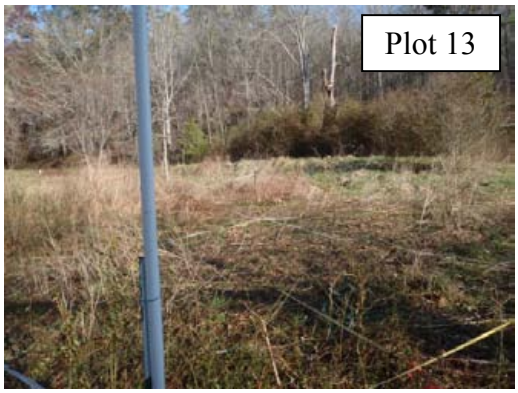


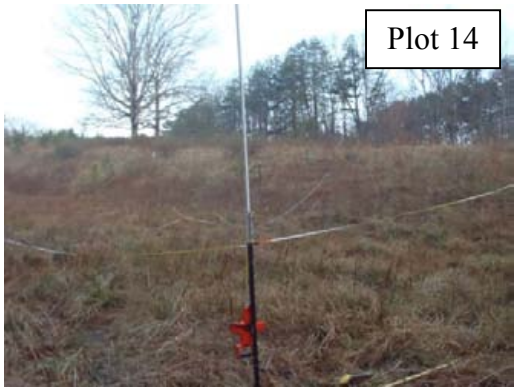


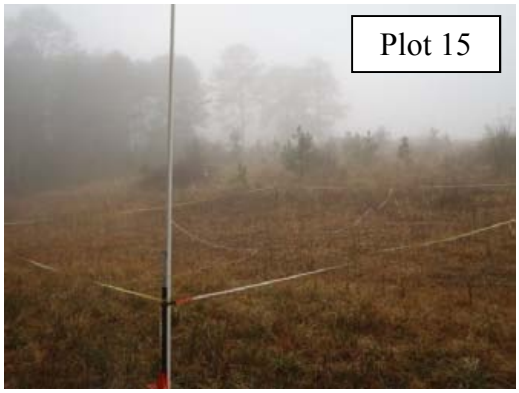




Martin's Creek II
Baseline Vegetation Monitoring Photographs
Taken March 25, 2014
(continued)







Appendix C.
Vegetation Plot Data

Table 5. Planted Stems
Table 6. Planted and Total Stem Counts

Table 5. Planted Woody Vegetation

Species	Quantity
Bare Root	
River birch (*Betula nigra*)	790
Pignut hickory (*Carya glabra*)	350
Mockernut hickory (*Carya tomentosa/alba*)	350
Persimmon (*Diospyros virginiana*)	200
Tulip poplar (*Liriodendron tulipifera*)	990
Sycamore (*Platanus occidentalis*)	788
Scarlet oak (*Quercus coccinea*)	700
Cherrybark oak (*Quercus pagoda*)	1088
Water oak (*Quercus nigra*)	588
Northern red oak (*Quercus rubra*)	988
1-gallon Containers	
Common serviceberry (*Amelanchier arborea*)	25
Tag alder (*Alnus serrulata*)	17
Ironwood (*Carpinus caroliniana*)	50
Winterberry (*Ilex verticillata*)	17
TOTAL	**6941**

Table 6. Total and Planted Stem Counts
EEP Project Code 92633. Project Name: Martin's Creek II

			Current Plot Data (MY0 2014)																						
			92633-01-0001			92633-01-0002			92633-01-0003			92633-01-0004			92633-01-0005			92633-01-0006			92633-01-0007			92633-01-0008		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer rubrum	red maple	Tree																							
Betula nigra	river birch	Tree							1	1	1				2	2	2				1	1	1			
Carya	hickory	Tree																							
Carya alba	mockernut hickory	Tree																							
Fagus grandifolia	American beech	Tree																							
Juglans nigra	black walnut	Tree																							
Liriodendron tulipifera	tuliptree	Tree	1	1	1	3	3	3	2	2	2	2	2	2	4	4	4	2	2	2	1	1	1	3	3	3
Platanus occidentalis	American sycamore	Tree	3	3	3	4	4	4				3	3	3				2	2	2				3	3	3
Quercus	oak	Tree	3	3	3				2	2	2	2	2	2	1	1	1	4	4	4	6	6	6	4	4	4
Quercus coccinea	scarlet oak	Tree																							
Quercus michauxii	swamp chestnut oak	Tree																							
Quercus nigra	water oak	Tree				4	4	4	4	4	4	1	1	1	1	1	1	5	5	5	2	2	2			
Quercus pagoda	cherrybark oak	Tree																			1	1	1			
Quercus rubra	northern red oak	Tree							1	1	1	1	1	1												
Unknown		Shrub or Tree	1	1	1																					
		Stem count	8	8	8	11	11	11	10	10	10	9	9	9	8	8	8	13	13	13	11	11	11	10	10	10
		size (ares)	1			1			1			1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
		Species count	4	4	4	3	3	3	5	5	5	5	5	5	4	4	4	4	4	4	5	5	5	3	3	3
		Stems per ACRE	323.7	323.7	323.7	445.2	445.2	445.2	404.7	404.7	404.7	364.2	364.2	364.2	323.7	323.7	323.7	526.1	526.1	526.1	445.2	445.2	445.2	404.7	404.7	404.7

Color for Density
Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%

PnoLS = Planted stems excluding live stakes
P-all = Planted stems including live stakes
T = Planted stems and natural recruits
Total includes stems of natural recruits

Table 6. Total and Planted Stem Counts
EEP Project Code 92633. Project Name: Martin's Creek II

			Current Plot Data (MY) 2014)																			Annual Means		
			92633-01-0009			92633-01-0010			92633-01-0011			92633-01-0012			92633-01-0013			92633-01-0014			92633-01-0015			MY0 (2014)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	red maple	Tree															1								1
Betula nigra	river birch	Tree				4	4	4										1	1	1				9	9	9
Carya	hickory	Tree							1	1	1				1	1	1							2	2	2
Carya alba	mockernut hickory	Tree							3	3	3													3	3	3
Fagus grandifolia	American beech	Tree									5															5
Juglans nigra	black walnut	Tree															2									2
Liriodendron tulipifera	tuliptree	Tree	2	2	2	1	1	1	1	1	1	1	1	1							1	1	1	24	24	24
Platanus occidentalis	American sycamore	Tree	1	1	1	3	3	3	3	3	3							5	5	5				27	27	27
Quercus	oak	Tree	1	1	1							6	6	6	4	4	4	1	1	1	6	6	6	40	40	40
Quercus coccinea	scarlet oak	Tree	1	1	1	1	1	1										1	1	1				3	3	3
Quercus michauxii	swamp chestnut oak	Tree	2	2	2										1	1	1				1	1	1	4	4	4
Quercus nigra	water oak	Tree																						17	17	17
Quercus pagoda	cherrybark oak	Tree																						1	1	1
Quercus rubra	northern red oak	Tree																						2	2	2
Unknown		Shrub or Tree	1	1	1																			2	2	2
		Stem count	8	8	8	9	9	9	8	8	13	7	7	7	6	6	9	8	8	8	8	8	8	134	134	142
		size (ares)	1			1			1			1			1			1			1			15		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.37		
		Species count	6	6	6	4	4	4	4	4	5	2	2	2	3	3	5	4	4	4	3	3	3	12	12	15
		Stems per ACRE	323.7	323.7	323.7	364.2	364.2	364.2	323.7	323.7	526.1	283.3	283.3	283.3	242.8	242.8	364.2	323.7	323.7	323.7	323.7	323.7	323.7	361.5	361.5	383.1

Color for Density
Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%

PnoLS = Planted stems excluding live stakes
P-all = Planted stems including live stakes
T = Planted stems and natural recruits
Total includes stems of natural recruits

Appendix D.
Stream Geomorphology Data

Tables 7a-7d. Baseline Stream Data Summary
Tables 8a-8f. Monitoring Data-Dimensional Data Summary
Cross-section Plots
Longitudinal Profile Plots

Table 7a. Baseline Stream Data Summary (UT -1 to Martin's Creek)
Martin's Creek II Mitigation Project - EEP Project Number 92633

Parameter	Gauge	Regional Curve			Pre-Existing Condition (UT-1)					Reference Reach(es) Data					Design (UT-1)			Monitoring Baseline (UT-1 Reach 4)				
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD	Min	Mean	Med	Max	SD	Min	Max	Med	Min	Mean	Med	Max	SD
BF Width (ft)					5.9	8.5	7.6	14.0	3.0	11.7			21.7		7.7	8.5		6.4	7.1	6.6	8.4	1.1
Floodprone Width (ft)					9.0	17.0	16.2	30.8	8.2	20			410		16	100		25	25	25	25	0
BF Mean Depth (ft)					0.3	0.6	0.6	0.8	0.2	0.6			1.0		0.5	0.7		0.5	0.6	0.6	0.8	0.2
BF Max Depth (ft)					0.6	0.9	1.0	1.1	0.2	0.9			2.5		0.7	0.9		0.8	1.0	0.9	1.2	0.2
BF Cross Sectional Area (ft^2)					3.6	4.7	4.3	6.2	1.2	10.2			13.1		4.1	6.0		3.2	4.5	3.8	6.4	1.7
Width/Depth Ratio					7.6	18.8	12.6	55.0	18.0	10.7			17.0		12.0	14.3		10.5	11.4	11.0	12.8	1.2
Entrenchment Ratio					1.2	2.0	2.0	2.9	0.6	1.7			32.0		2.0	11.8		1.5	1.5	1.5	1.6	0.1
Bank Height Ratio					1.0	2.0	1.8	4.1	1.1	1.0			1.0		1.0	1.0		1.0	1.0	1.0	1.0	0.0
Profile																						
Riffle length (ft)																		5	21	20	40	8
Riffle slope (ft/ft)					0.025			0.170		0.2000			1.9000		0.0100	0.1600		0.0009	0.0166	0.0148	0.0337	0.0111
Pool length (ft)																		8.0	22.0	22.0	37.0	9.5
Pool Max depth (ft)										2.2			2.5		1.6	2.0		2.1	2.3	2.3	2.4	0.2
Pool spacing (ft)					30.0			85.0		48.0			231.0		12.0	45.0		27.0	42.0	40.0	61.0	11.0
Pattern																						
Channel Beltwidth (ft)										16			55				40			40		
Radius of Curvature (ft)										28			47		30	40		30			40	
Rc:Bankfull width (ft/ft)										2			3		3.8	4.7		3.8			4.7	
Meander Wavelength (ft)										70			260		15	30		15			30	
Meander Width ratio										1.1			4.1				4.7			4.7		
Transport parameters																						
Reach Shear Stress (competency) lbs/ft^2																						
Max part size (mm) mobilized at bankfull																						
Stream Power (transport capacity) W/m^2																						
Additional Reach Parameters																						
Rosgen Classification					Eb/Fb/B/G/Cb					Aa/Bc					B/C			B/C				
Bankfull Velocity (fps)					4.2-4.4										3.9-4.3							
Bankfull Discharge (cfs)					16 - 25																	
Valley Length (ft)					1565					----												
Channel Thalweg Length (ft)					1747					----					----			781				
Sinuosity					1.06 - 1.18					1.19					1.05-1.4			1.05-1.4				
Water Surface Slope (ft/ft)					0.015 - 0.05					0.0333					.01-.057			0.0135				
BF slope (ft/ft)					----					----					----			----				
Bankfull Floodplain Area (acres)					----					----					----			----				
% of Reach with Eroding Banks					----					----												
Channel Stability or Habitat Metric					----					----												
Biological or Other					----					----												

Table 7b. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Martin's Creek II Mitigation Project - EEP Project Number 92633

Parameter	Pre-Existing Condition							Reference Reach(es) Data							Design							Monitoring Baseline						
Ri%/RU%P%G%/S%																											
SC%/SA%/G%/C%/B%BE%																											
d16/d35/d50/d84/d95	.6-.8	2-4.4	3.6-8.7	15.9-28	66.8-																						
Entrainment Class <1.5/1.5-1.99/2.0-4.9/5.0-																											
Incision Class <1.2/1.2-1.49/1.5-1.99/>2.0																											

Table 7c. Baseline Stream Data Summary (UT -1 to Martin's Creek)
Martin's Creek II Mitigation Project - EEP Project Number 92633

Parameter	Gauge	Regional Curve			Pre-Existing Condition (UT-1)					Reference Reach(es) Data					Design (UT-1)			Monitoring Baseline (UT-1 Reach 2)				
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD	Min	Mean	Med	Max	SD	Min	Max	Med	Min	Mean	Med	Max	SD
BF Width (ft)					5.9	8.5	7.6	14.0	3.0	11.7			21.7		7.7	8.5		8.0			8.7	
Floodprone Width (ft)					9.0	17.0	16.2	30.8	8.2	20			410		16	100			25			
BF Mean Depth (ft)					0.3	0.6	0.6	0.8	0.2	0.6			1.0		0.5	0.7			0.7			
BF Max Depth (ft)					0.6	0.9	1.0	1.1	0.2	0.9			2.5		0.7	0.9			1.1			
BF Cross Sectional Area (ft^2)					3.6	4.7	4.3	6.2	1.2	10.2			13.1		4.1	6.0		5.2			5.9	
Width/Depth Ratio					7.6	18.8	12.6	55.0	18.0	10.7			17.0		12.0	14.3		12.3			12.8	
Entrenchment Ratio					1.2	2.0	2.0	2.9	0.6	1.7			32.0		2.0	11.8		2.9			3.1	
Bank Height Ratio					1.0	2.0	1.8	4.1	1.1	1.0			1.0		1.0	1.0			1.0			
Profile																						
Riffle length (ft)																		5	21	20	40	8
Riffle slope (ft/ft)					0.025			0.170		0.2000			1.9000		0.0100	0.1600		0.0009	0.0166	0.0148	0.0337	0.0111
Pool length (ft)																		8.0	22.0	22.0	37.0	9.5
Pool Max depth (ft)										2.2			2.5		1.6	2.0		2.1	2.3	2.3	2.4	0.2
Pool spacing (ft)					30.0			85.0		48.0			231.0		12.0	45.0		27.0	42.0	40.0	61.0	11.0
Pattern																						
Channel Beltwidth (ft)										16			55				40			40		
Radius of Curvature (ft)										28			47		30	40		30			40	
Rc:Bankfull width (ft/ft)										2			3		3.8	4.7		3.8			4.7	
Meander Wavelength (ft)										70			260		15	30		15			30	
Meander Width ratio										1.1			4.1				4.7			4.7		
Transport parameters																						
Reach Shear Stress (competency) lbs/ft^2																						
Max part size (mm) mobilized at bankfull																						
Stream Power (transport capacity) W/m^2																						
Additional Reach Parameters																						
Rosgen Classification					Eb/Fb/B/G/Cb					Aa/Bc					B/C			C				
Bankfull Velocity (fps)					4.2-4.4										3.9-4.3							
Bankfull Discharge (cfs)					16 - 25																	
Valley Length (ft)					1565					----												
Channel Thalweg Length (ft)					1747					----					----			1176				
Sinuosity					1.06 - 1.18					1.19					1.05-1.4			1.05-1.4				
Water Surface Slope (ft/ft)					0.015 - 0.05					0.0333					.01-.057			0.0577				
BF slope (ft/ft)					----					----					----			----				
Bankfull Floodplain Area (acres)					----					----					----			----				
% of Reach with Eroding Banks					----					----												
Channel Stability or Habitat Metric					----					----												
Biological or Other					----					----												

Table 7d. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Martin's Creek II Mitigation Project - EEP Project Number 92633

Parameter	Pre-Existing Condition							Reference Reach(es) Data							Design							Monitoring Baseline						
Ri%/RU%P%G%/S%																											
SC%/SA%/G%/C%/B%BE%																											
d16/d35/d50/d84/d95	.6-.8	2-4.4	3.6-8.7	15.9-28	66.8-																						
Entrainment Class <1.5/1.5-1.99/2.0-4.9/5.0-																											
Incision Class <1.2/1.2-1.49/1.5-1.99/>2.0																											

Table 7e. Baseline Stream Data Summary (UT 1-3 to Martin's Creek)
Martin's Creek II Mitigation Project - EEP Project Number 92633

Parameter	Gauge	Regional Curve			Pre-Existing Condition					Reference Reach(es) Data					Design			Monitoring Baseline (UT 1-3)				
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD	Min	Mean	Med	Max	SD	Min	Max	Med	Min	Mean	Med	Max	SD
BF Width (ft)					5.0	7.5	6.9	11.4	2.7	11.7			21.7		6.0	6.5		5.1	8.0	6.8	11.4	2.5
Floodprone Width (ft)					10.3	15.4	12.6	26.2	7.3	20			410		11	100		14	77	100	100	39
BF Mean Depth (ft)					0.3	0.4	0.4	0.6	0.1	0.6			1.0		0.5	0.5		0.3	0.6	0.5	0.9	0.2
BF Max Depth (ft)					0.9	0.9	0.9	1.0	0.1	0.9			2.5				0.6	0.5	0.9	0.9	1.2	0.3
BF Cross Sectional Area (ft^2)					2.9	3.0	3.0	3.3	0.2	10.2			13.1		2.9	3.2		1.7	5.1	3.0	9.9	3.5
Width/Depth Ratio					8.6	19.9	15.6	39.7	13.6	10.7			17.0				12.5	11.9	15.5	14.3	22.7	3.8
Entrenchment Ratio					1.5	2.1	2.0	2.7	0.6	1.7			32.0		3.8	15.4		2.7	9.4	9.4	15.4	5.0
Bank Height Ratio					1.0	1.7	1.4	3.0	0.9	1.0			1.0		1.0	1.0		1.0	1.0	1.0	1.0	0.0
Profile																						
Riffle length (ft)																		7	19	18	51	10
Riffle slope (ft/ft)					0.013			0.100		0.2000			1.9000		0.0100	0.1800		0.0215	0.0457	0.0445	0.0667	0.0125
Pool length (ft)																		3.0	6.0	6.0	10.0	2.0
Pool Max depth (ft)										2.2			2.5				1.6					
Pool spacing (ft)					20.0			100.0		48.0			231.0		10.0	60.0		15.0	25.0	23.0	58.0	10.0
Pattern																						
Channel Beltwidth (ft)					22			46		16			55		26	50				40		
Radius of Curvature (ft)					14			28		28			47		15	40		30			40	
Rc:Bankfull width (ft/ft)					1.2			5.6		2			3		2.5	6.7		3.8			4.7	
Meander Wavelength (ft)					56			81		70			260		65	110		15			30	
Meander Width ratio					1.9			9.2		1.1			4.1		4.3	8.3				4.7		
Transport parameters																						
Reach Shear Stress (competency) lbs/ft^2																						
Max part size (mm) mobilized at bankfull																						
Stream Power (transport capacity) W/m^2																						
Additional Reach Parameters																						
Rosgen Classification					Eb/B/C/F					Aa/Bc					B/C			E				
Bankfull Velocity (fps)					6-Feb										3.8 - 4.9							
Bankfull Discharge (cfs)					11.0 - 14.0																	
Valley Length (ft)					1320					----												
Channel Thalweg Length (ft)					1584					----					----			2092				
Sinuosity					1.2					1.19					1.26-1.42			1.2				
Water Surface Slope (ft/ft)					0.007-0.04					0.0333					0.005-0.054			0.0161				
BF slope (ft/ft)					----					----					----			----				
Bankfull Floodplain Area (acres)					----					----					----			----				
% of Reach with Eroding Banks					----					----												
Channel Stability or Habitat Metric					----					----												
Biological or Other					----					----												

Table 7f. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Martin's Creek II Mitigation Project - EEP Project Number 92633

Parameter	Pre-Existing Condition							Reference Reach(es) Data							Design							Monitoring Baseline						
Substrate																												
Ri%/RU%P%G%/S%																												
SC%/SA%/G%/C%/B%BE%																												
d16/d35/d50/d84/d95	0.3	1.1	3.5	12.1	15.7																							
Entrainment Class <1.5/1.5-1.99/2.0-4.9/5.0-																												
Incision Class <1.2/1.2-1.49/1.5-1.99/>2.0																												

Table 8a. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters - Cross Sections)
Martin's Creek II Mitigation Project - EEP Project Number 92633

Parameter	Cross Section 1 (UT 1-3)							Cross Section 2 (UT 1-3)							Cross Section 3 (UT 1-3)							Cross Section 4 (UT 1-3)							Cross Section 5 (UT 1-3)							Cross Section 6 (UT 1-3)						
	Riffle							Riffle							Riffle							Pool							Riffle							Pool						
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+
BF Width (ft)	11.4							11.4							6.8							7.7							8.3							9.2						
Floodprone Width (ft) (approx)	100.0							100.0							100.0							NA							100.0							NA						
BF Mean Depth (ft)	0.8							0.9							0.4							0.9							0.7							1.3						
BF Max Depth (ft)	1.2							1.2							0.6							2.0							1.2							2.7						
BF Cross Sectional Area (ft^2)	9.6							9.9							2.8							7.3							6.2							12.0						
Width/Depth Ratio	13.5							13.1							16.5							NA							11.1							NA						
Entrenchment Ratio	8.8							8.8							14.7							NA							12.0							NA						
Bank Height Ratio	1.0							1.0							1.0							1.0							1.0							1.0						
d50 (mm)	----							15.0							----							----							----							----						
Parameter	**Cross Section 7 (UT 1-3)**							**Cross Section 8 (UT 1-3)**							**Cross Section 9 (UT 1-3)**							**Cross Section 10 (UT 1-3)**							**Cross Section 11 (UT 1-3)**							**Cross Section 12 (UT 1-3)**						
	Pool							Riffle							Pool							Pool							Riffle							Riffle						
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+
BF Width (ft)	6.5							6.5							10.6							5.3							6.8							5.1						
Floodprone Width (ft) (approx)	NA							100.0							NA							NA							25.0							14.0						
BF Mean Depth (ft)	1.1							0.5							0.9							0.6							0.3							0.3						
BF Max Depth (ft)	2.7							0.9							2.0							1.2							0.6							0.5						
BF Cross Sectional Area (ft^2)	7.1							3.0							9.3							3.3							2.3							1.7						
Width/Depth Ratio	NA							14.1							NA							NA							20.1							15.3						
Entrenchment Ratio	NA							15.4							NA							NA							3.7							2.7						
Bank Height Ratio	1.0							1.0							1.0							1.0							1.0							1.0						
d50 (mm)	----							----							----							----							----							----						

Table 8b. Monitoring Data - Stream Reach Data Summary
Martin's Creek II Mitigation Project - EEP Project Number 92633

Parameter	Baseline (UT 1-3)					MY-1 (UT 1-3)					MY-2 (UT 1-3)					MY-3 (UT 1-3)					MY-4 (UT 1-3)					MY-5 (UT 1-3)				
Dimension and Substrate - Riffle Only	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**
BF Width (ft)	5.1	8.0	6.8	11.4	2.5																								
Floodprone Width (ft)	14	77	100	100	39																								
BF Mean Depth (ft)	0.3	0.6	0.5	0.9	0.2																								
BF Max Depth (ft)	0.5	0.9	0.9	1.2	0.3																								
BF Cross Sectional Area (ft^2)	1.7	5.1	3.0	9.9	3.5																								
Width/Depth Ratio	11.9	15.5	14.3	22.7	3.8																								
Entrenchment Ratio	2.7	9.4	9.4	15.4	5.0																								
Bank Height Ratio	1.0	1.0	1.0	1.0	0.0																								
Profile																													
Riffle length (ft)	4	20	19	41	8.9																								
Riffle slope (ft/ft)	0.0000	0.0185	0.0166	0.0550	0.0145																								
Pool length (ft)	3.0	14.0	12.0	33.0	8.7																								
Pool Max depth (ft)	1.2	2.1	2.0	2.7	0.6																								
Pool spacing (ft)	7.0	34.0	31.0	63.0	15.0																								
Pattern																													
Channel Beltwidth (ft)	26			50																									
Radius of Curvature (ft)	15			40																									
Rc:Bankfull width (ft/ft)	2.5			6.7																									
Meander Wavelength (ft)	65			110																									
Meander Width ratio	4.3			8.3																									
Additional Reach Parameters																													
Rosgen Classification	E-type																												
Channel Thalweg Length (ft)	2092																												
Sinuosity	1.3																												
Water Surface Slope (Channel) (ft/ft)	0.0161																												
BF slope (ft/ft)	-----																												
Ri%/RU%/P%/G%/S%																													
SC%/SA%/G%/C%/B%/BE%																													
d16/d35/d50/d84/d95																													
% of Reach with Eroding Banks																													
Channel Stability or Habitat Metric																													
Biological or Other																													

Table 8c. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters - Cross Sections)
Martin's Creek II Mitigation Project - EEP Project Number 92633

Parameter	Cross Section 13 (UT 1 Reach 4) Riffle							Cross Section 14 (UT 1 Reach 4) Riffle							Cross Section 15 (UT 1 Reach 4) Pool							Cross Section 16 (UT 1 Reach 4) Riffle							Cross Section 17 (UT 1 Reach 4) Pool						
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+
BF Width (ft)	6.6							6.4							13.4							8.4							9.7						
Floodprone Width (ft) (approx)	25.0							25.0							NA							25.0							NA						
BF Mean Depth (ft)	0.6							0.5							0.8							0.8							1.4						
BF Max Depth (ft)	0.9							0.8							2.1							1.2							2.4						
BF Cross Sectional Area (ft^2)	3.8							3.2							10.9							6.4							13.2						
Width/Depth Ratio	11.5							12.8							NA							11.0							NA						
Entrenchment Ratio	3.8							3.9							NA							3.0							NA						
Bank Height Ratio	1.0							1.0							1.0							1.0							1.0						
d50 (mm)	----							----							----							----							----						

Table 8d. Monitoring Data - Stream Reach Data Summary
Martin's Creek II Mitigation Project - EEP Project Number 92633

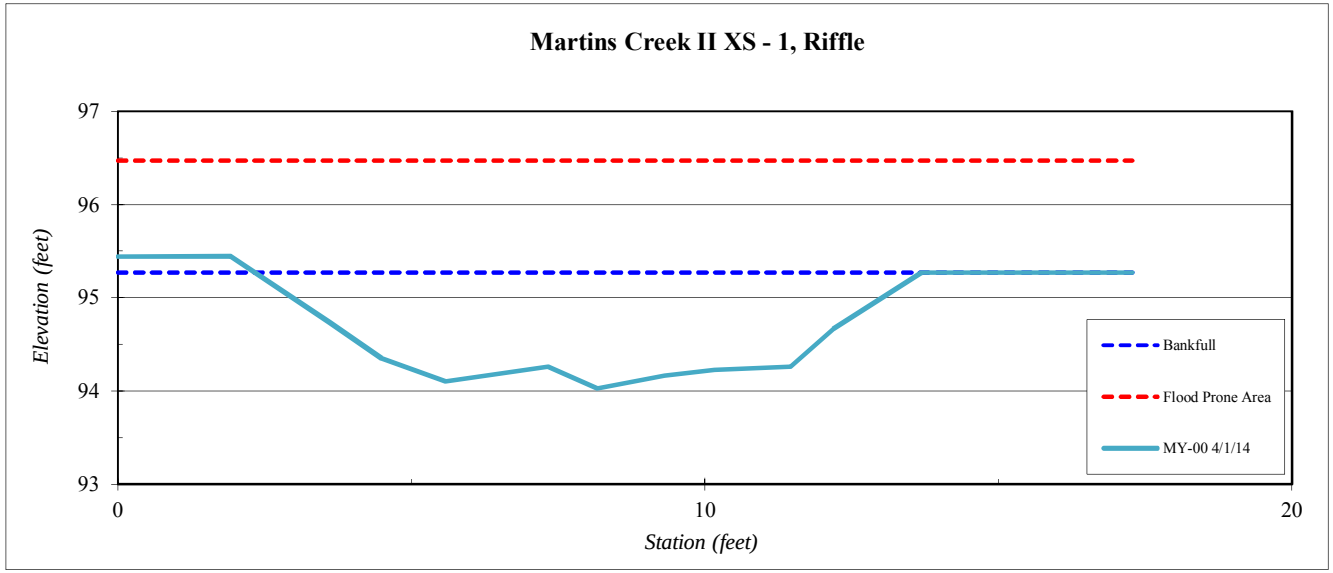
Parameter	Baseline (UT 1 Reach 4)					MY-1 (UT 1 Reach 4)					MY-2 (UT 1 Reach 4)					MY-3 (UT 1 Reach 4)					MY-4 (UT 1 Reach 4)					MY-5 (UT 1 Reach 4)				
Dimension and Substrate - Riffle Only	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**
BF Width (ft)	6.4	7.1	6.6	8.4	1.1																									
Floodprone Width (ft)	25	25	25	25	0																									
BF Mean Depth (ft)	0.5	0.6	0.6	0.8	0.2																									
BF Max Depth (ft)	0.8	1.0	0.9	1.2	0.2																									
BF Cross Sectional Area (ft^2)	3.2	4.5	3.8	6.4	1.7																									
Width/Depth Ratio	10.5	11.4	11.0	12.8	1.2																									
Entrenchment Ratio	1.5	1.5	1.5	1.6	0.1																									
Bank Height Ratio	1.0	1.0	1.0	1.0	0.0																									
Profile - Upstream																														
Riffle length (ft)	5	21	20	40	8																									
Riffle slope (ft/ft)	0.0009	0.0166	0.0148	0.0337	0.0111																									
Pool length (ft)	8.0	22.0	22.0	37.0	9.5																									
Pool Max depth (ft)	2.1	2.3	2.3	2.4	0.2																									
Pool spacing (ft)	27.0	42.0	40.0	61.0	11.0																									
Pattern																														
Channel Beltwidth (ft)			40																											
Radius of Curvature (ft)	30			40																										
Rc:Bankfull width (ft/ft)	3.8			4.7																										
Meander Wavelength (ft)	15			30																										
Meander Width ratio			4.7																											
Additional Reach Parameters																														
Rosgen Classification	B/C - Type																													
Channel Thalweg Length (ft)	781																													
Sinuosity	1.2																													
Water Surface Slope (Channel) (ft/ft)	0.0135																													
BF slope (ft/ft)	-----																													
Ri%/RU%/P%/G%/S%																														
SC%/SA%/G%/C%/B%/BE%																														
d16/d35/d50/d84/d95																														
% of Reach with Eroding Banks																														
Channel Stability or Habitat Metric																														
Biological or Other																														

Site	Martins Creek II
Watershed:	Hiwassee
XS ID	XS - 1, Riffle
Feature	Riffle
Date:	4/1/2014
Field Crew:	Perkinson, Jernigan

Station	Elevation
0.00	95.44
1.92	95.45
3.61	94.74
4.50	94.35
5.58	94.10
7.33	94.26
8.17	94.03
9.31	94.17
10.16	94.23
11.46	94.26
12.19	94.66
13.69	95.27
15.32	95.27
17.28	95.27

SUMMARY DATA	
Bankfull Elevation:	95.3
Bankfull Cross-Sectional Area:	9.6
Bankfull Width:	11.4
Flood Prone Area Elevation:	96.5
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.2
Mean Depth at Bankfull:	0.8
W / D Ratio:	13.5
Entrenchment Ratio:	8.8
Bank Height Ratio:	1.0

Stream Type	E

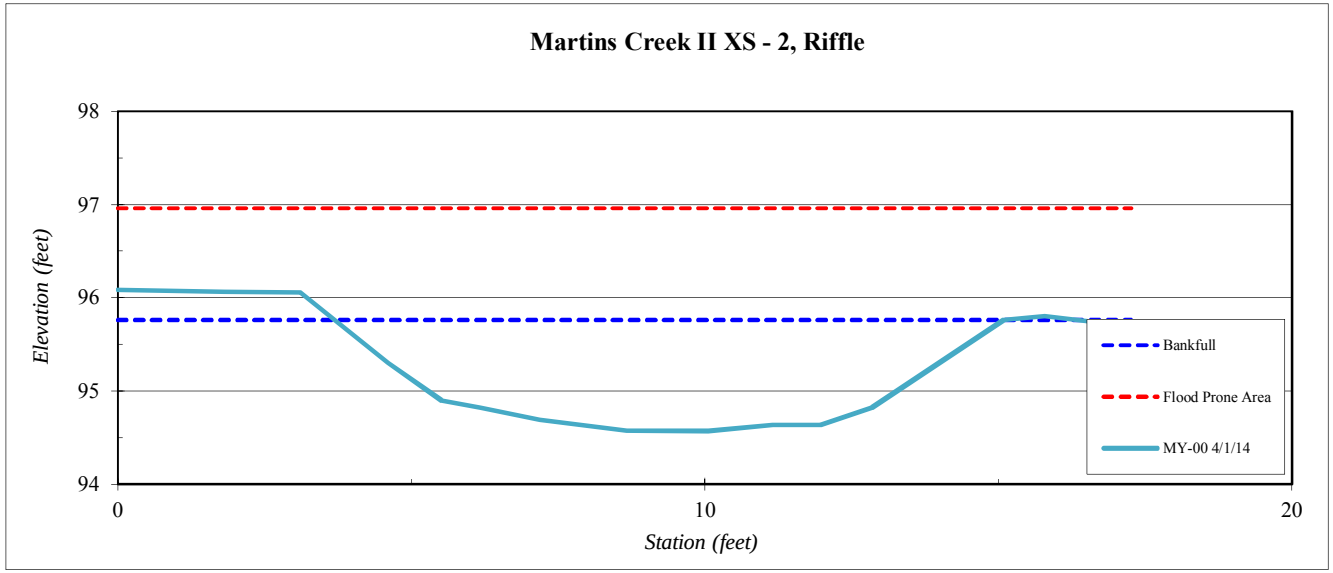


Site	Martins Creek II
Watershed:	Hiwassee
XS ID	XS - 2, Riffle
Feature	Riffle
Date:	4/1/2014
Field Crew:	Perkinson, Jernigan

Station	Elevation
0.00	96.08
1.81	96.06
3.11	96.06
4.60	95.30
5.51	94.90
6.18	94.82
7.18	94.69
8.66	94.57
10.07	94.57
11.16	94.64
11.97	94.64
12.85	94.82
15.08	95.76
15.78	95.80
17.26	95.70

SUMMARY DATA	
Bankfull Elevation:	95.8
Bankfull Cross-Sectional Area:	9.9
Bankfull Width:	11.4
Flood Prone Area Elevation:	97.0
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.2
Mean Depth at Bankfull:	0.9
W / D Ratio:	13.1
Entrenchment Ratio:	8.8
Bank Height Ratio:	1.0

Stream Type	E

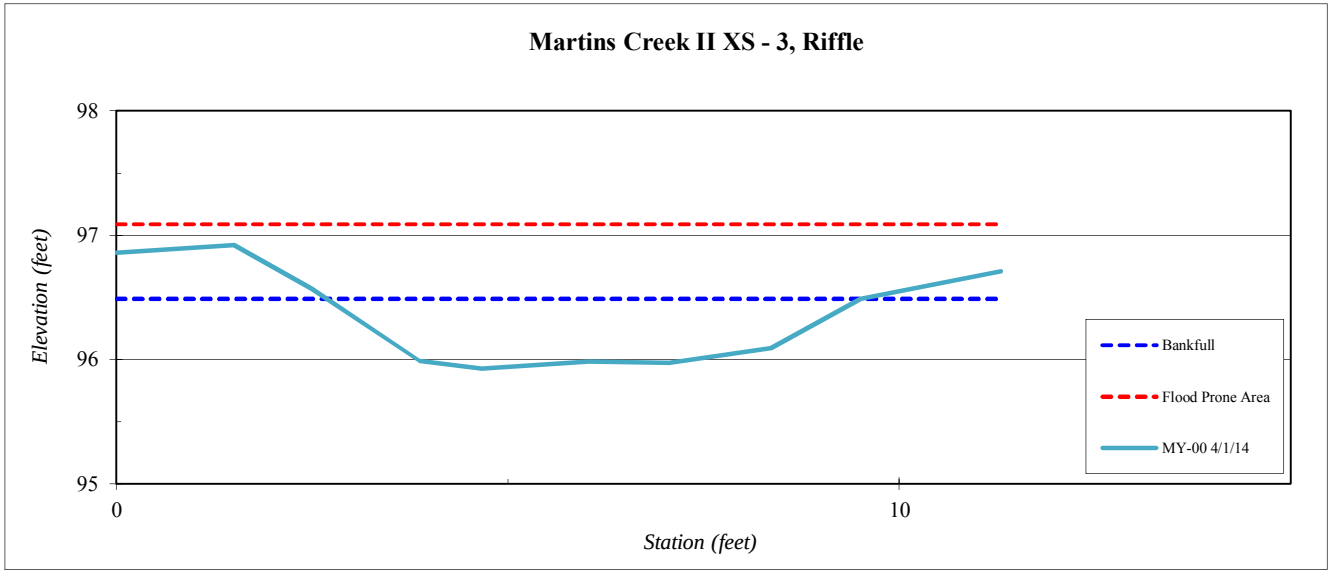


Site	Martins Creek II
Watershed:	Hiwassee
XS ID	XS - 3, Riffle
Feature	Riffle
Date:	4/1/2014
Field Crew:	Perkinson, Jernigan

Station	Elevation
0.00	96.86
1.50	96.92
2.49	96.57
3.87	95.99
4.66	95.93
6.03	95.98
7.06	95.97
8.36	96.09
9.51	96.49
11.30	96.71

SUMMARY DATA	
Bankfull Elevation:	96.5
Bankfull Cross-Sectional Area:	2.8
Bankfull Width:	6.8
Flood Prone Area Elevation:	97.1
Flood Prone Width:	100.0
Max Depth at Bankfull:	0.6
Mean Depth at Bankfull:	0.4
W / D Ratio:	16.5
Entrenchment Ratio:	14.7
Bank Height Ratio:	1.0

Stream Type	E

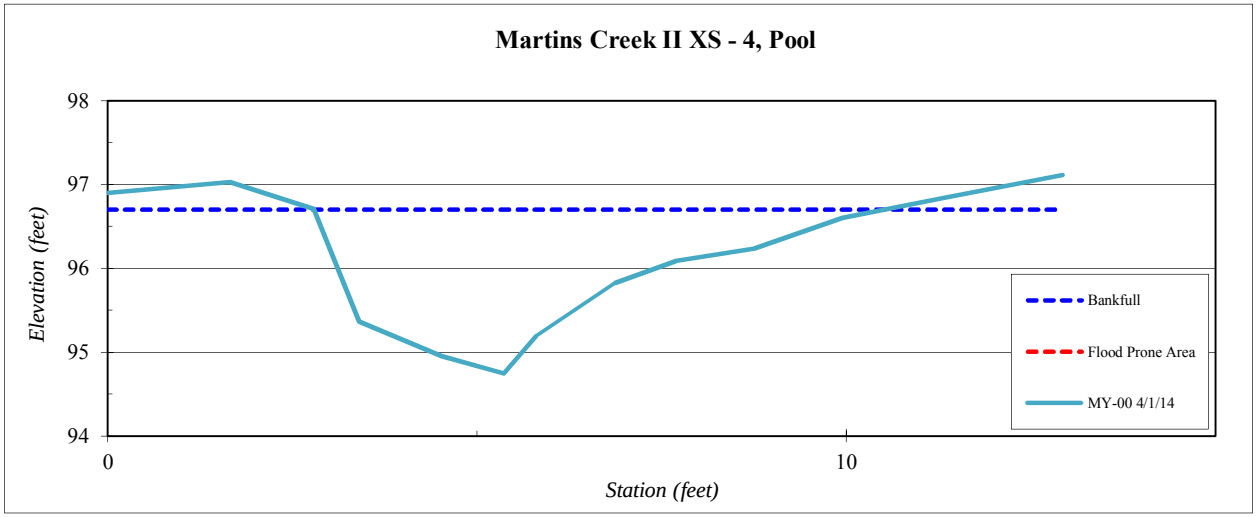


Site	Martins Creek II
Watershed:	Hiwassee
XS ID	XS - 4, Pool
Feature	Pool
Date:	4/1/2014
Field Crew:	Perkinson, Jernigan

Station	Elevation
0.0	96.9
1.7	97.0
2.8	96.7
3.4	95.4
4.5	94.9
5.4	94.7
5.8	95.2
6.9	95.8
7.7	96.1
8.8	96.2
9.9	96.6
11.3	96.8
12.9	97.1

SUMMARY DATA	
Bankfull Elevation:	96.7
Bankfull Cross-Sectional Area:	7.3
Bankfull Width:	7.7
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	2.0
Mean Depth at Bankfull:	0.9
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	E

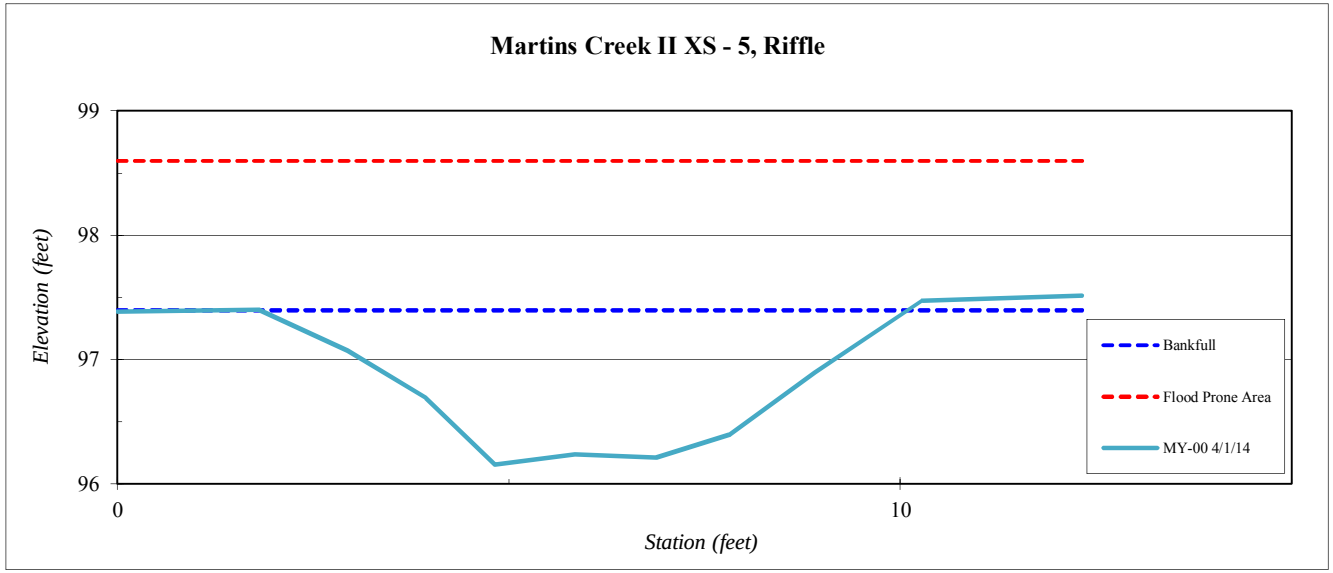


Site	Martins Creek II
Watershed:	Hiwassee
XS ID	XS - 5, Riffle
Feature	Riffle
Date:	4/1/2014
Field Crew:	Perkinson, Jernigan

Station	Elevation
0.00	97.38
1.80	97.40
2.94	97.07
3.94	96.69
4.82	96.15
5.84	96.24
6.88	96.21
7.82	96.40
8.91	96.89
10.27	97.48
12.32	97.52

SUMMARY DATA	
Bankfull Elevation:	97.4
Bankfull Cross-Sectional Area:	6.2
Bankfull Width:	8.3
Flood Prone Area Elevation:	98.6
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.2
Mean Depth at Bankfull:	0.7
W / D Ratio:	11.1
Entrenchment Ratio:	12.0
Bank Height Ratio:	1.0

Stream Type	E

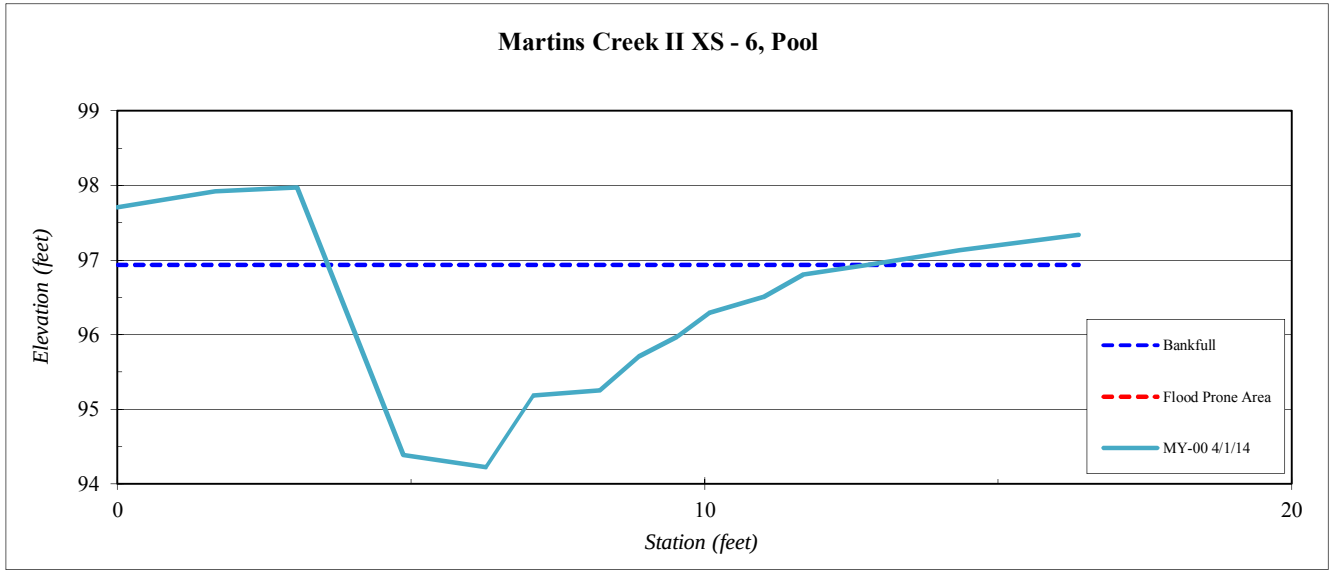


Site	Martins Creek II
Watershed:	Hiwassee
XS ID	XS - 6, Pool
Feature	Pool
Date:	4/1/2014
Field Crew:	Perkinson, Jernigan

Station	Elevation
0.00	97.71
1.66	97.92
3.06	97.97
4.87	94.39
6.27	94.23
7.09	95.19
8.22	95.26
8.89	95.71
9.54	95.97
10.08	96.29
11.01	96.51
11.69	96.81
12.85	96.94
14.34	97.13
16.37	97.34

SUMMARY DATA	
Bankfull Elevation:	96.9
Bankfull Cross-Sectional Area:	12.0
Bankfull Width:	9.2
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	2.7
Mean Depth at Bankfull:	1.3
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	E

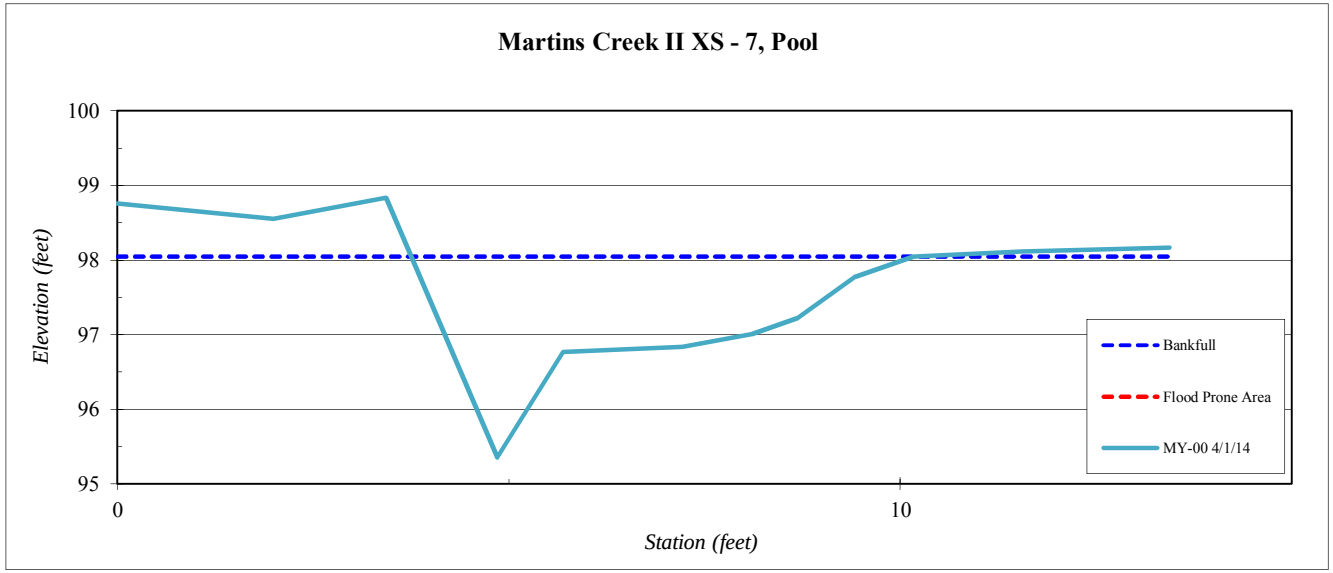


Site	Martins Creek II
Watershed:	Hiwassee
XS ID	XS - 7, Pool
Feature	Pool
Date:	4/1/2014
Field Crew:	Perkinson, Jernigan

Station	Elevation
0.00	98.76
1.99	98.55
3.43	98.84
4.85	95.35
5.69	96.77
7.22	96.84
8.11	97.01
8.68	97.22
9.42	97.77
10.17	98.05
11.56	98.11
13.44	98.16

SUMMARY DATA	
Bankfull Elevation:	98.1
Bankfull Cross-Sectional Area:	7.1
Bankfull Width:	6.5
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	2.7
Mean Depth at Bankfull:	1.1
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	E

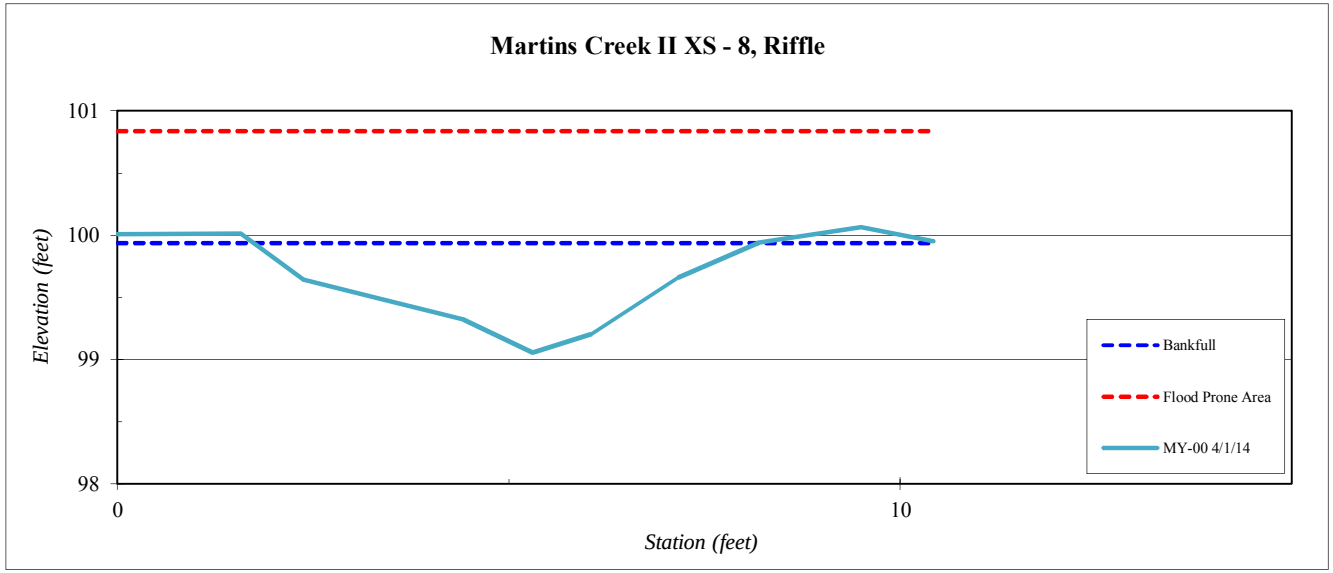


Site	Martins Creek II
Watershed:	Hiwassee
XS ID	XS - 8, Riffle
Feature	Riffle
Date:	4/1/2014
Field Crew:	Perkinson, Jernigan

Station	Elevation
0.00	100.01
1.58	100.01
2.37	99.64
3.35	99.49
4.41	99.32
5.30	99.06
6.06	99.20
7.16	99.66
8.19	99.94
9.49	100.07
10.43	99.95

SUMMARY DATA	
Bankfull Elevation:	99.9
Bankfull Cross-Sectional Area:	3.0
Bankfull Width:	6.5
Flood Prone Area Elevation:	100.8
Flood Prone Width:	100.0
Max Depth at Bankfull:	0.9
Mean Depth at Bankfull:	0.5
W / D Ratio:	14.1
Entrenchment Ratio:	15.4
Bank Height Ratio:	1.0

Stream Type	E

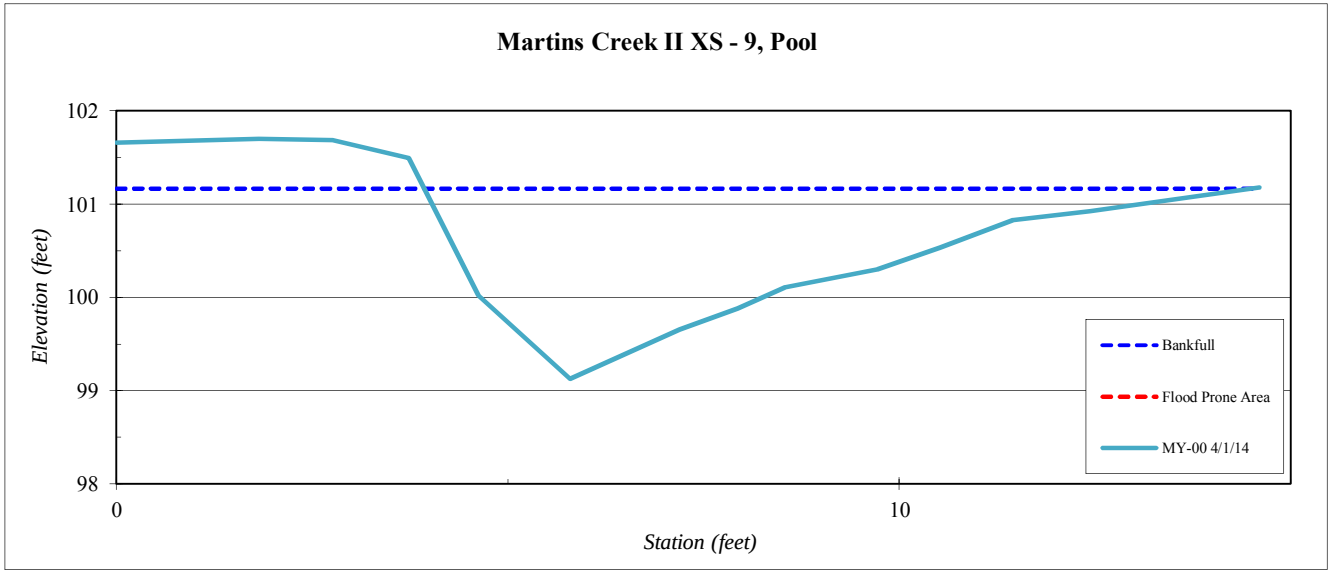


Site	Martins Creek II
Watershed:	Hiwassee
XS ID	XS - 9, Pool
Feature	Pool
Date:	4/1/2014
Field Crew:	Perkinson, Jernigan

Station	Elevation
0.00	101.66
1.82	101.70
2.76	101.68
3.73	101.49
4.62	100.02
5.79	99.13
7.19	99.66
7.93	99.88
8.54	100.11
9.72	100.30
10.52	100.53
11.45	100.83
12.44	100.92
14.60	101.18

SUMMARY DATA	
Bankfull Elevation:	101.2
Bankfull Cross-Sectional Area:	9.3
Bankfull Width:	10.6
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	2.0
Mean Depth at Bankfull:	0.9
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	E

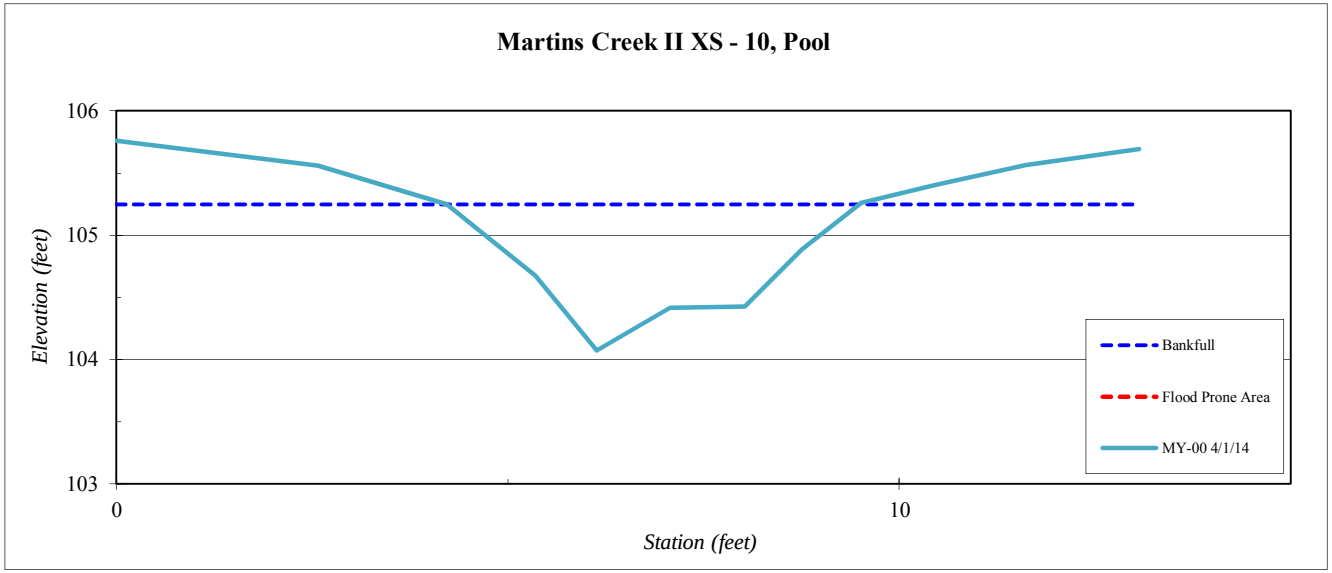


Site	Martins Creek II
Watershed:	Hiwassee
XS ID	XS - 10, Pool
Feature	Pool
Date:	4/1/2014
Field Crew:	Perkinson, Jernigan

Station	Elevation
0.00	105.76
2.58	105.56
4.21	105.25
5.35	104.67
6.14	104.07
7.08	104.42
8.03	104.43
8.75	104.88
9.51	105.26
10.46	105.41
11.61	105.57
13.07	105.69

SUMMARY DATA	
Bankfull Elevation:	105.3
Bankfull Cross-Sectional Area:	3.3
Bankfull Width:	5.3
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.2
Mean Depth at Bankfull:	0.6
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	E

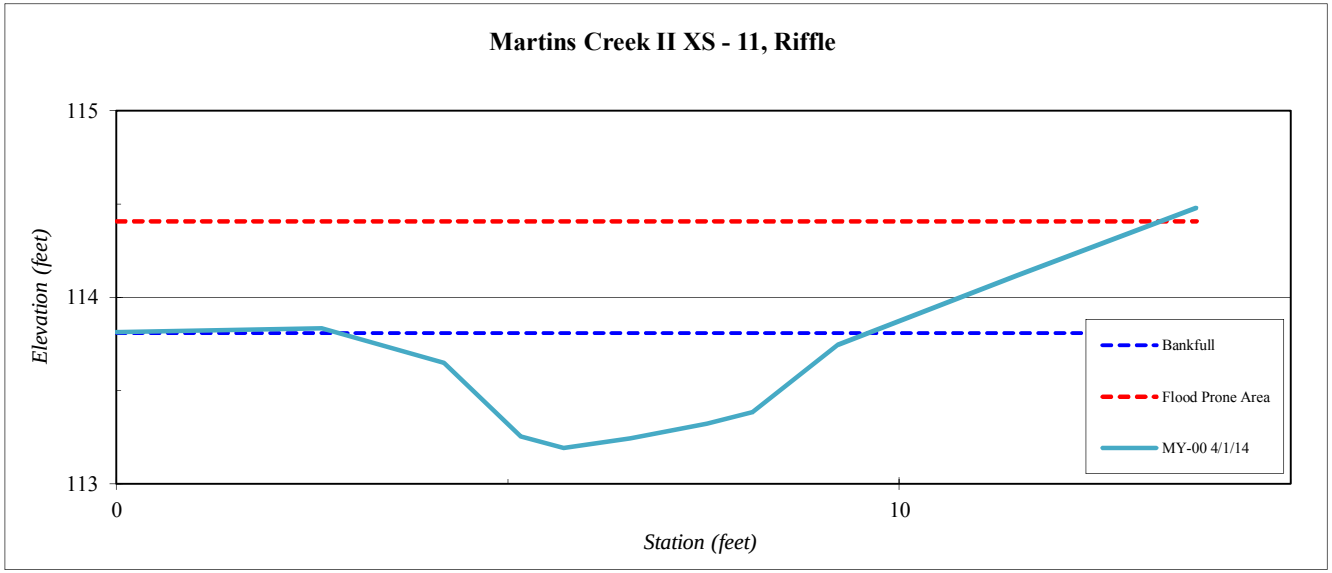


Site	Martins Creek II
Watershed:	Hiwassee
XS ID	XS - 11, Riffle
Feature	Riffle
Date:	4/1/2014
Field Crew:	Perkinson, Jernigan

Station	Elevation
0.00	113.81
2.62	113.84
4.19	113.65
5.16	113.25
5.71	113.19
6.56	113.24
7.54	113.32
8.13	113.38
9.21	113.74
11.50	114.11
13.79	114.48

SUMMARY DATA	
Bankfull Elevation:	113.8
Bankfull Cross-Sectional Area:	2.3
Bankfull Width:	6.8
Flood Prone Area Elevation:	114.4
Flood Prone Width:	25.0
Max Depth at Bankfull:	0.6
Mean Depth at Bankfull:	0.3
W / D Ratio:	20.1
Entrenchment Ratio:	3.7
Bank Height Ratio:	1.0

Stream Type	E

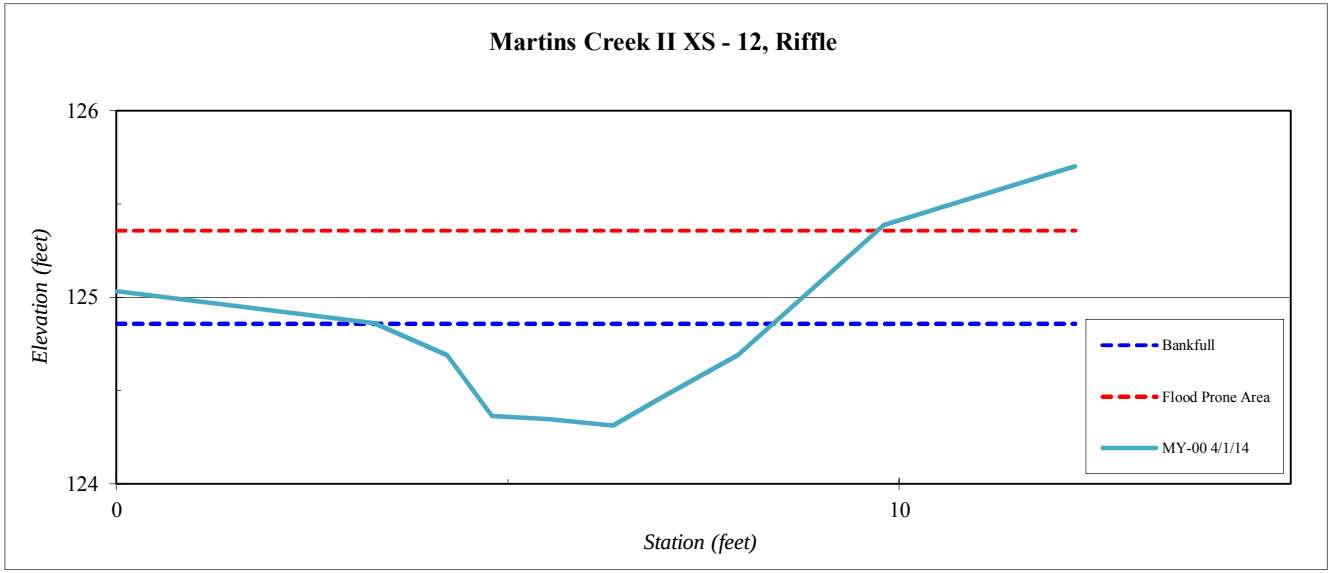


Site	Martins Creek II
Watershed:	Hiwassee
XS ID	XS - 12, Riffle
Feature	Riffle
Date:	4/1/2014
Field Crew:	Perkinson, Jernigan

Station	Elevation
0.00	125.03
3.29	124.86
4.22	124.69
4.80	124.36
5.52	124.35
6.34	124.31
6.98	124.47
7.94	124.69
9.80	125.39
12.24	125.70

SUMMARY DATA	
Bankfull Elevation:	124.9
Bankfull Cross-Sectional Area:	1.7
Bankfull Width:	5.1
Flood Prone Area Elevation:	125.4
Flood Prone Width:	14.0
Max Depth at Bankfull:	0.5
Mean Depth at Bankfull:	0.3
W / D Ratio:	15.3
Entrenchment Ratio:	2.7
Bank Height Ratio:	1.0

Stream Type	E

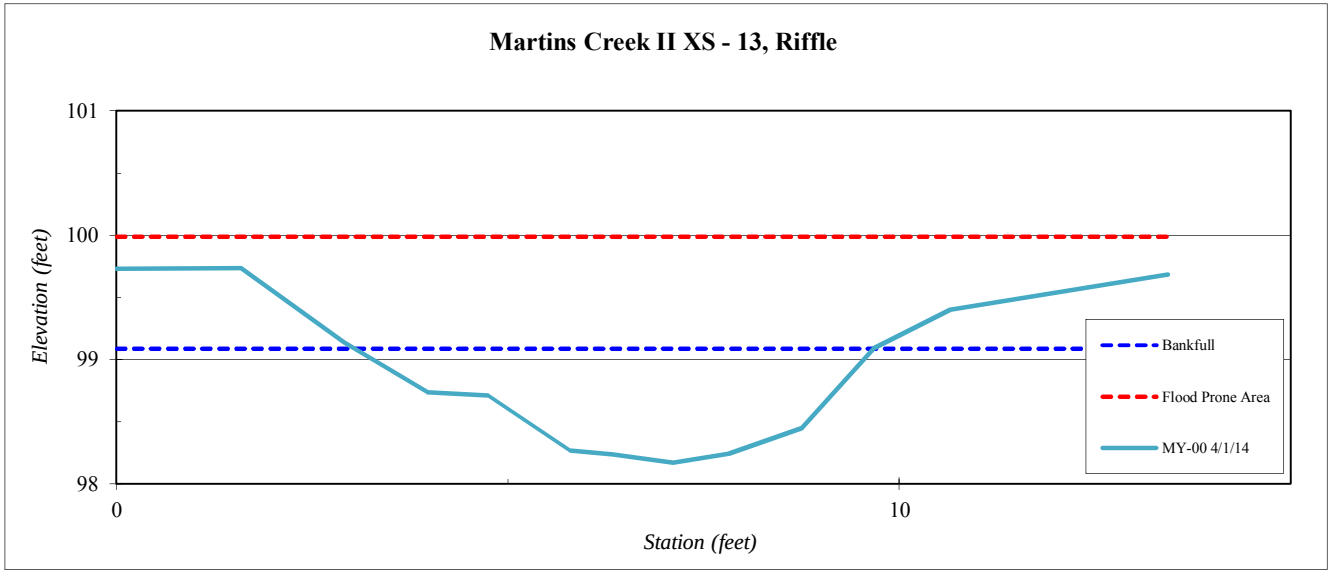


Site	Martins Creek II
Watershed:	Hiwassee
XS ID	XS - 13, Riffle
Feature	Riffle
Date:	4/1/2014
Field Crew:	Perkinson, Jernigan

Station	Elevation
0.00	99.73
1.59	99.73
2.91	99.14
3.97	98.74
4.74	98.71
5.79	98.27
6.33	98.24
7.11	98.17
7.82	98.24
8.76	98.45
9.67	99.09
10.65	99.40
13.43	99.69

SUMMARY DATA	
Bankfull Elevation:	99.1
Bankfull Cross-Sectional Area:	3.8
Bankfull Width:	6.6
Flood Prone Area Elevation:	100.0
Flood Prone Width:	25.0
Max Depth at Bankfull:	0.9
Mean Depth at Bankfull:	0.6
W / D Ratio:	11.5
Entrenchment Ratio:	3.8
Bank Height Ratio:	1.0

Stream Type	E

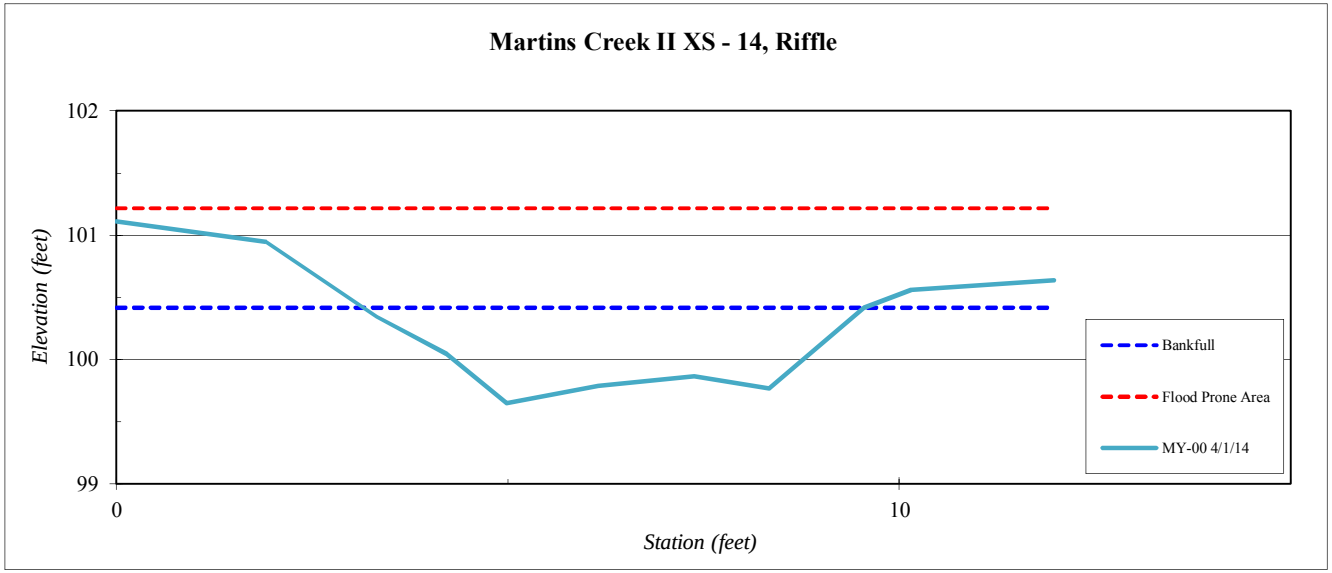


Site	Martins Creek II
Watershed:	Hiwassee
XS ID	XS - 14, Riffle
Feature	Riffle
Date:	4/1/2014
Field Crew:	Perkinson, Jernigan

Station	Elevation
0.00	101.11
1.91	100.95
3.33	100.35
4.22	100.04
4.98	99.65
6.15	99.79
7.38	99.86
8.33	99.77
9.54	100.42
10.15	100.56
11.98	100.64

SUMMARY DATA	
Bankfull Elevation:	100.4
Bankfull Cross-Sectional Area:	3.2
Bankfull Width:	6.4
Flood Prone Area Elevation:	101.2
Flood Prone Width:	25.0
Max Depth at Bankfull:	0.8
Mean Depth at Bankfull:	0.5
W / D Ratio:	12.8
Entrenchment Ratio:	3.9
Bank Height Ratio:	1.0

Stream Type	E

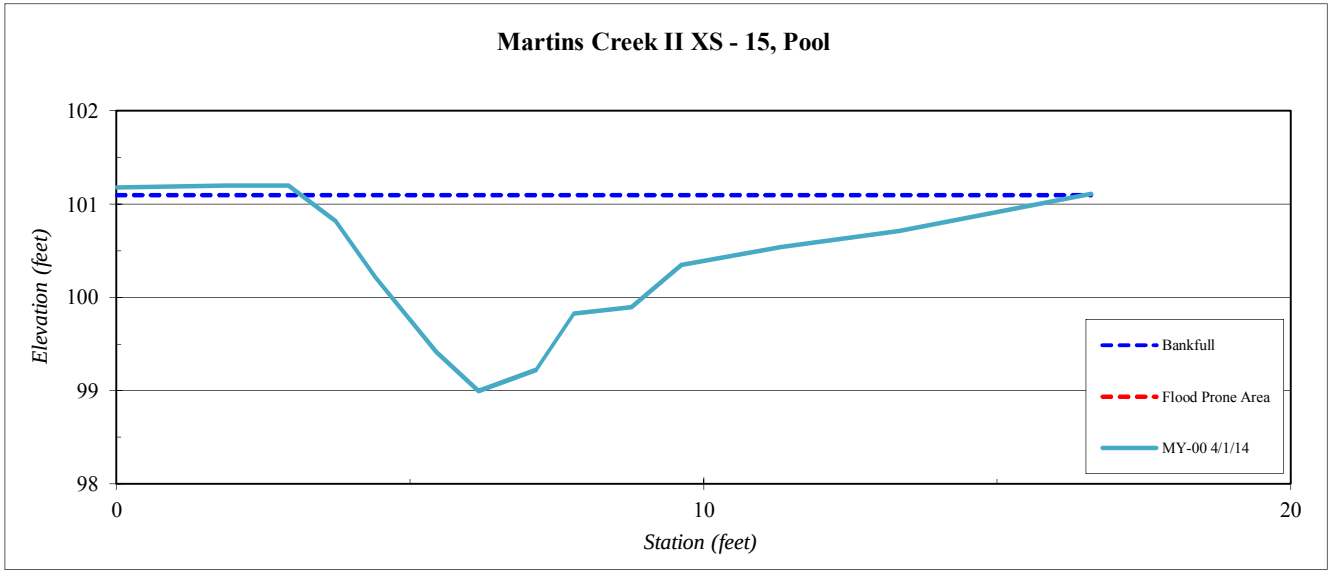


Site	Martins Creek II
Watershed:	Hiwassee
XS ID	XS - 15, Pool
Feature	Pool
Date:	4/1/2014
Field Crew:	Perkinson, Jernigan

Station	Elevation
0.00	101.18
1.88	101.20
2.93	101.20
3.72	100.82
4.41	100.21
5.44	99.41
6.17	98.99
7.15	99.22
7.79	99.82
8.77	99.89
9.63	100.35
11.32	100.54
13.33	100.71
16.59	101.11

SUMMARY DATA	
Bankfull Elevation:	101.1
Bankfull Cross-Sectional Area:	10.9
Bankfull Width:	13.4
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	2.1
Mean Depth at Bankfull:	0.8
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	E

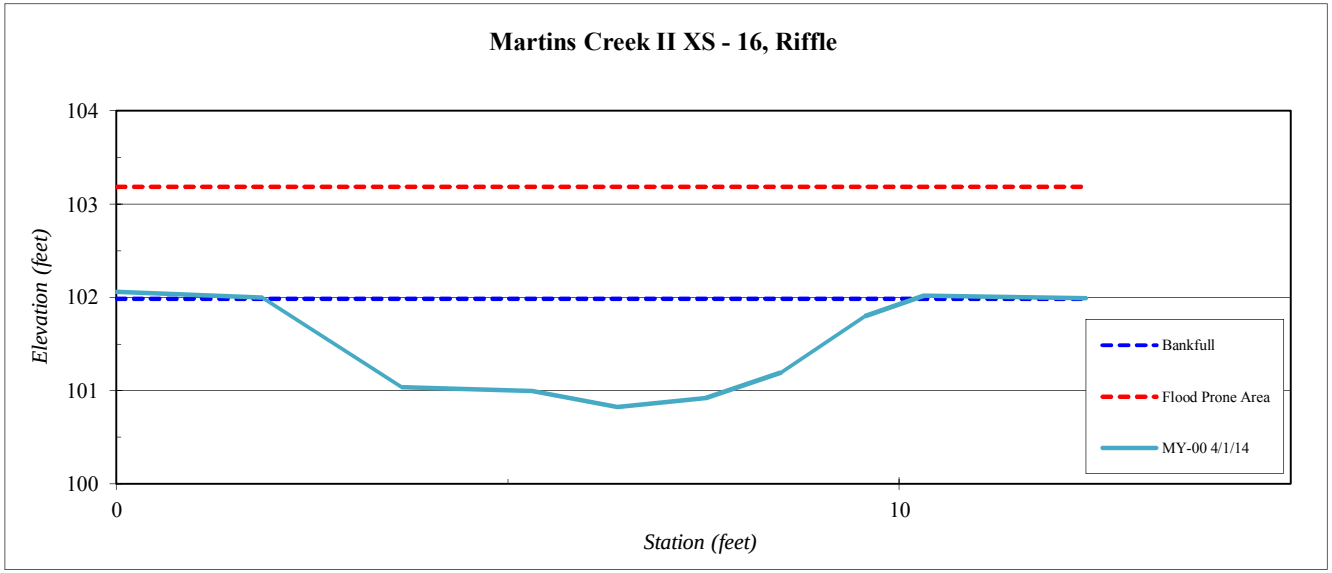


Site	Martins Creek II
Watershed:	Hiwassee
XS ID	XS - 16, Riffle
Feature	Riffle
Date:	4/1/2014
Field Crew:	Perkinson, Jernigan

Station	Elevation
0.00	102.06
1.86	102.00
3.64	101.04
5.31	101.00
6.40	100.82
7.52	100.92
8.49	101.20
9.56	101.80
10.31	102.02
12.38	101.99

SUMMARY DATA	
Bankfull Elevation:	102.0
Bankfull Cross-Sectional Area:	6.4
Bankfull Width:	8.4
Flood Prone Area Elevation:	103.2
Flood Prone Width:	25.0
Max Depth at Bankfull:	1.2
Mean Depth at Bankfull:	0.8
W / D Ratio:	11.0
Entrenchment Ratio:	3.0
Bank Height Ratio:	1.0

Stream Type	E

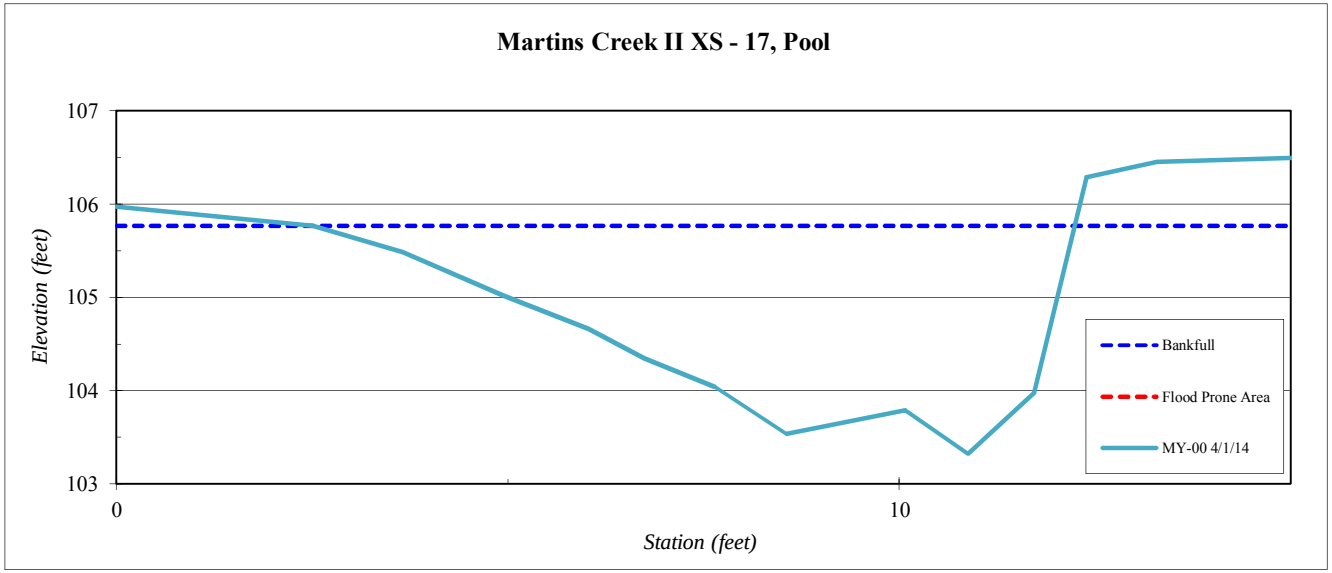


Site	Martins Creek II
Watershed:	Hiwassee
XS ID	XS - 17, Pool
Feature	Pool
Date:	4/1/2014
Field Crew:	Perkinson, Jernigan

Station	Elevation
0.00	105.98
2.51	105.77
3.66	105.49
4.94	105.02
6.03	104.66
6.74	104.35
7.65	104.04
8.56	103.54
10.08	103.79
10.88	103.32
11.72	103.98
12.39	106.29
13.29	106.46
15.24	106.50

SUMMARY DATA	
Bankfull Elevation:	105.8
Bankfull Cross-Sectional Area:	13.2
Bankfull Width:	9.7
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	2.4
Mean Depth at Bankfull:	1.4
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	E

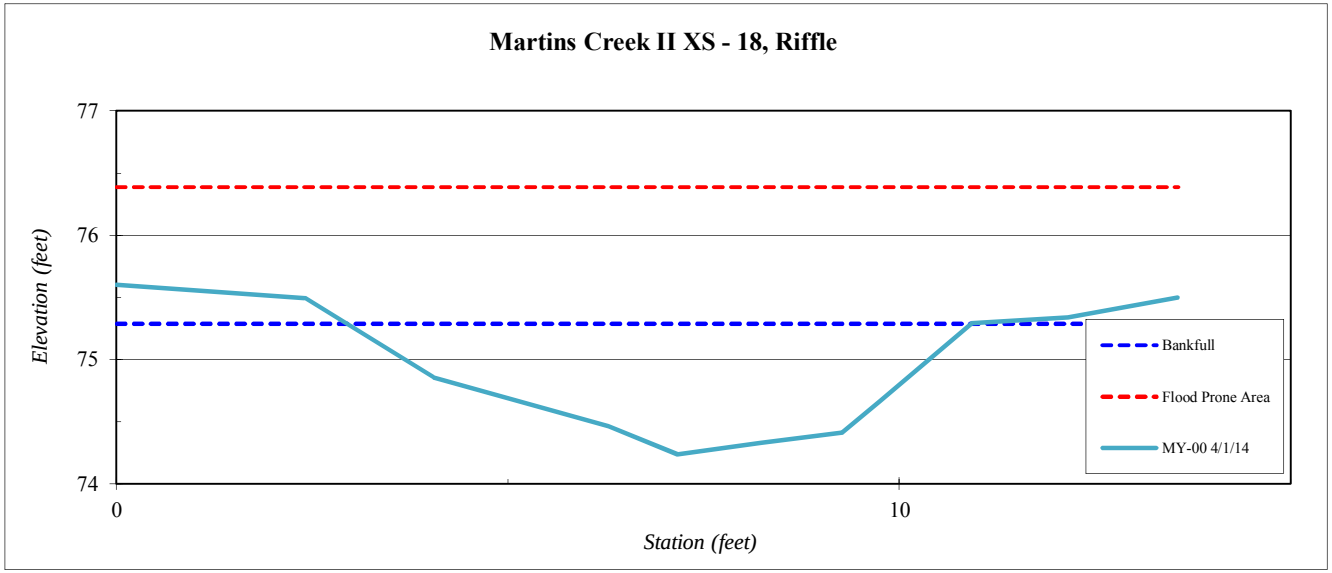


Site	Martins Creek II
Watershed:	Hiwassee
XS ID	XS - 18, Riffle
Feature	Riffle
Date:	4/1/2014
Field Crew:	Perkinson, Jernigan

Station	Elevation
0.00	75.60
2.40	75.49
4.05	74.86
5.49	74.60
6.28	74.46
7.17	74.24
8.23	74.33
9.27	74.41
9.75	74.66
10.93	75.30
12.16	75.34
13.56	75.50

SUMMARY DATA	
Bankfull Elevation:	75.3
Bankfull Cross-Sectional Area:	5.2
Bankfull Width:	8.0
Flood Prone Area Elevation:	76.4
Flood Prone Width:	25.0
Max Depth at Bankfull:	1.1
Mean Depth at Bankfull:	0.7
W / D Ratio:	12.3
Entrenchment Ratio:	3.1
Bank Height Ratio:	1.0

Stream Type	E

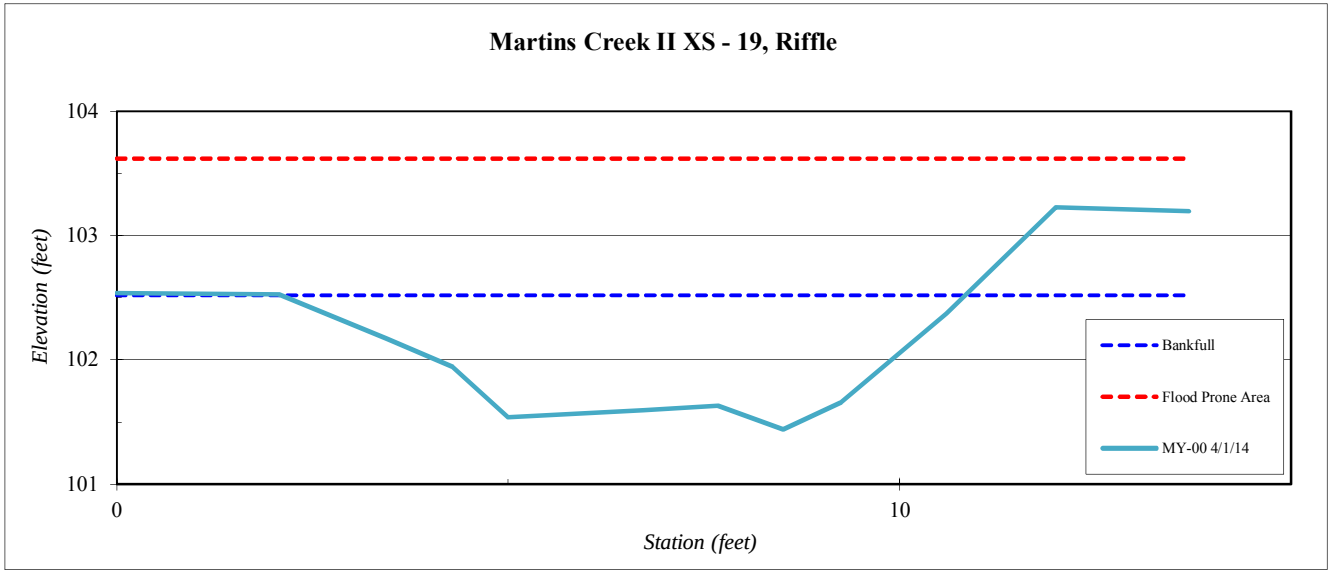


Site	Martins Creek II
Watershed:	Hiwassee
XS ID	XS - 19, Riffle
Feature	Riffle
Date:	4/1/2014
Field Crew:	Perkinson, Jernigan

Station	Elevation
0.00	102.54
2.07	102.53
3.45	102.17
4.29	101.95
5.00	101.54
6.73	101.60
7.68	101.63
8.51	101.44
9.25	101.66
10.60	102.37
12.00	103.23
13.69	103.20

SUMMARY DATA	
Bankfull Elevation:	102.5
Bankfull Cross-Sectional Area:	5.9
Bankfull Width:	8.7
Flood Prone Area Elevation:	103.6
Flood Prone Width:	25.0
Max Depth at Bankfull:	1.1
Mean Depth at Bankfull:	0.7
W / D Ratio:	12.8
Entrenchment Ratio:	2.9
Bank Height Ratio:	1.0

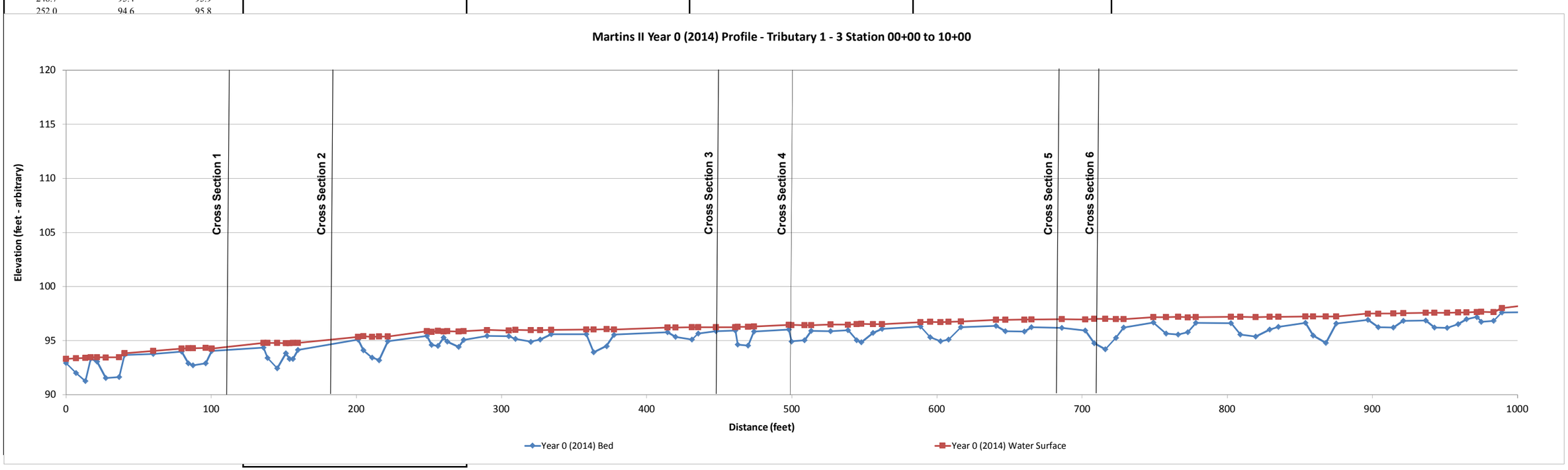
Stream Type	E



Project Name	Martins II - Profile
Reach	UT 1 - 3 Station 00+00 - 10+00
Feature	Profile
Date	4/4/14
Crew	Perkinson, Jernigan

2014 Year 0 Monitoring \Survey			2014 Year 1 Monitoring \Survey			2015 Year 2 Monitoring \Survey			2016 Year 3 Monitoring \Survey			2017 Year 4 Monitoring \Survey		
Station	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**
0.0	92.9	93.3												
6.9	92.0	93.4												
13.4	91.3	93.4												
17.0	93.3	93.5												
21.4	93.1	93.5												
27.4	91.5	93.4												
36.7	91.6	93.5												
40.3	93.7	93.8												
60.0	93.8	94.0												
79.6	94.0	94.3												
84.2	92.9	94.3												
87.5	92.7	94.3												
96.1	92.9	94.3												
100.3	94.1	94.3												
136.0	94.3	94.8												
138.7	93.4	94.8												
145.5	92.4	94.8												
151.4	93.8	94.8												
154.0	93.3	94.8												
156.4	93.3	94.8												
159.8	94.1	94.8												
201.2	95.1	95.4												
204.9	94.1	95.4												
210.9	93.4	95.3												
215.6	93.2	95.4												
221.8	94.9	95.4												
248.7	95.4	95.9												
252.0	94.6	95.8												

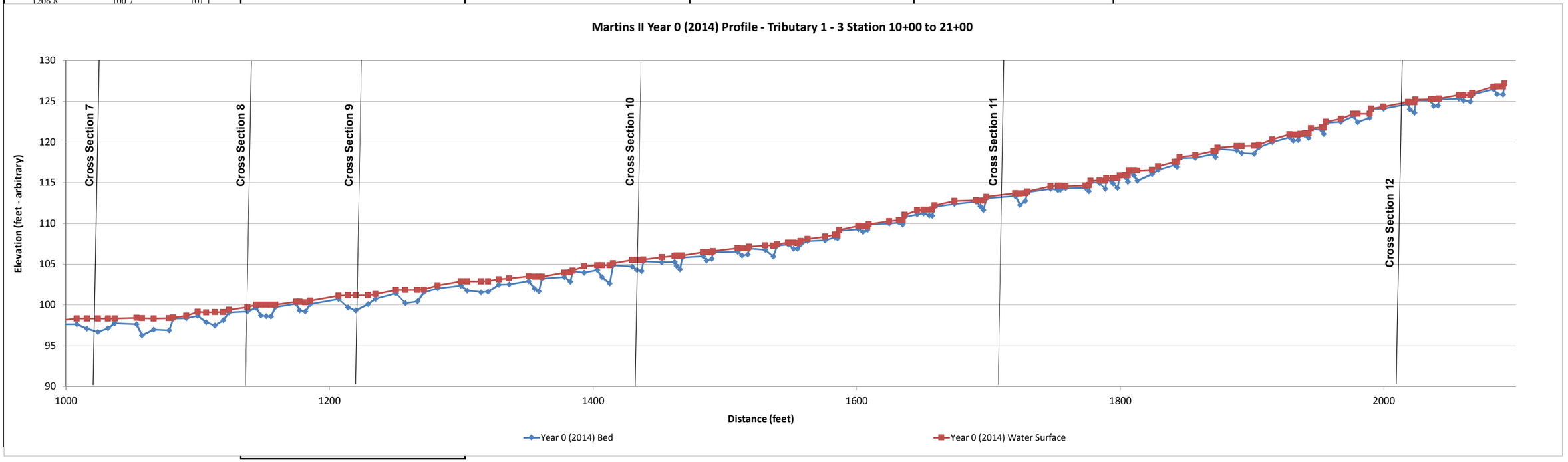
	2014	2014	2015	2016	2017
Avg. Water Surface Slope	0.0161				
Riffle Length	20				
Avg. Riffle Slope	0.0185				
Pool Length	14				
Pool to Pool Spacing	34.0				



Project Name	Martins II - Profile
Reach	UT 1 - 3 Station 10+00 - 21+00
Feature	Profile
Date	4/4/14
Crew	Perkinson, Jernigan

2014 Year 0 Monitoring \Survey			2014 Year 1 Monitoring \Survey			2015 Year 2 Monitoring \Survey			2016 Year 3 Monitoring \Survey			2017 Year 4 Monitoring \Survey		
Station	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**
989.2	97.6	98.0												
1008.3	97.6	98.3												
1015.8	97.1	98.3												
1024.1	96.7	98.3												
1032.0	97.1	98.3												
1037.1	97.7	98.3												
1053.7	97.6	98.4												
1057.7	96.3	98.4												
1066.5	97.0	98.3												
1078.3	96.9	98.4												
1081.3	98.3	98.4												
1091.4	98.4	98.7												
1100.0	98.7	99.1												
1106.3	97.9	99.1												
1112.9	97.5	99.1												
1119.2	98.1	99.1												
1123.8	99.1	99.4												
1137.8	99.2	99.7												
1144.4	99.6	100.0												
1148.0	98.7	100.0												
1152.1	98.6	100.0												
1155.5	98.6	100.0												
1158.9	99.7	100.0												
1174.7	100.2	100.4												
1177.3	99.3	100.4												
1181.7	99.2	100.3												
1185.5	100.1	100.5												
1206.8	100.7	101.1												

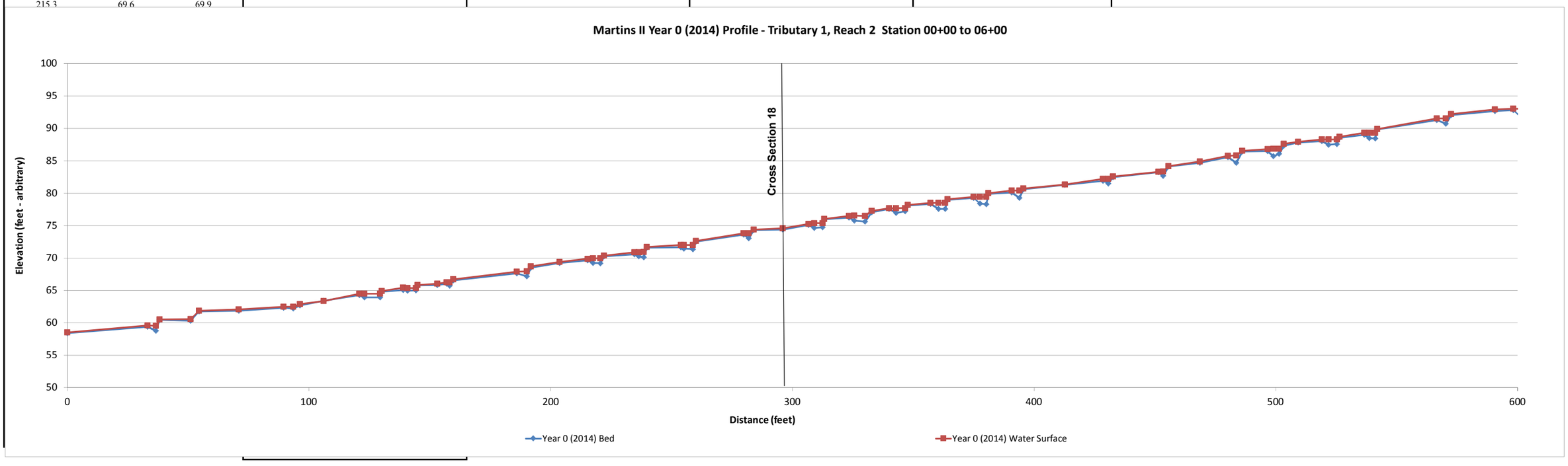
	2014	2014	2015	2016	2017
Avg. Water Surface Slope	0.0161				
Riffle Length	20				
Avg. Riffle Slope	0.0185				
Pool Length	14				
Pool to Pool Spacing	34.0				



Project Name	Martins II - Profile
Reach	UT 1 Reach 2 - Station 00+00 - 06+00
Feature	Profile
Date	4/4/14
Crew	Perkinson, Jernigan

2014 Year 0 Monitoring \Survey			2014 Year 1 Monitoring \Survey			2015 Year 2 Monitoring \Survey			2016 Year 3 Monitoring \Survey			2017 Year 4 Monitoring \Survey		
Station	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**
0.0	58.4	58.5												
33.2	59.4	59.6												
36.6	58.7	59.5												
38.2	60.4	60.5												
51.1	60.3	60.6												
54.5	61.8	61.8												
71.0	61.8	62.1												
89.4	62.3	62.4												
93.4	62.2	62.5												
96.2	62.7	62.9												
106.1	63.4	63.3												
120.8	64.3	64.5												
123.0	63.9	64.5												
129.5	63.9	64.5												
130.1	64.8	64.9												
138.9	65.0	65.4												
140.7	65.0	65.4												
144.2	65.0	65.4												
144.9	65.8	65.8												
153.0	65.8	66.0												
156.9	66.0	66.2												
158.1	65.7	66.2												
159.7	66.5	66.7												
186.0	67.6	67.9												
190.1	67.2	67.9												
191.8	68.5	68.7												
203.6	69.2	69.4												
215.3	69.6	69.9												

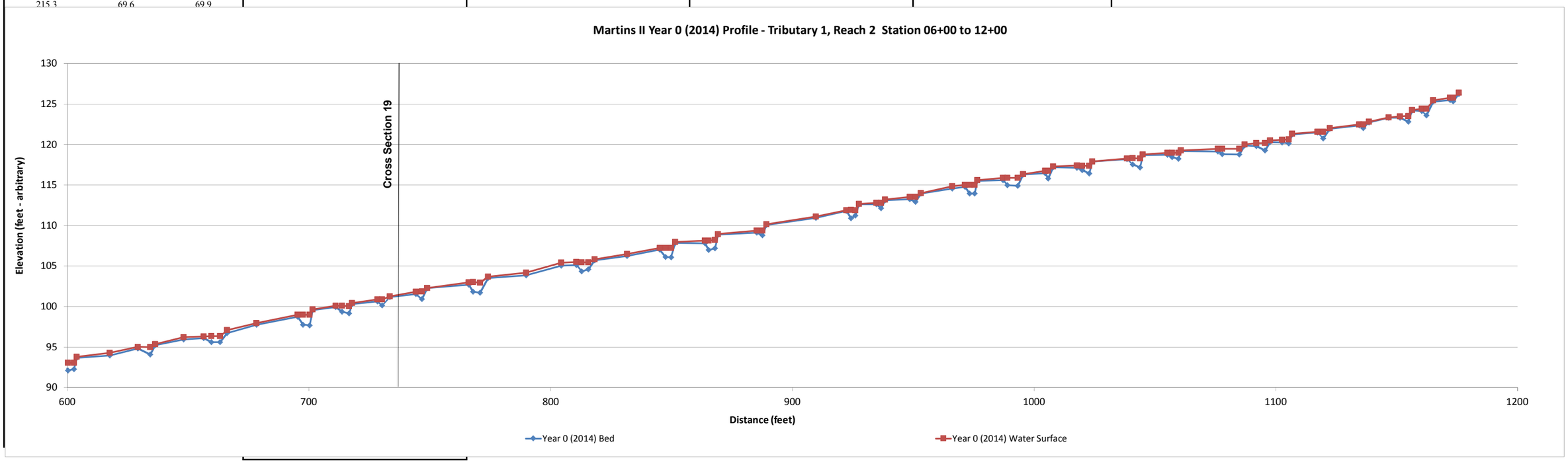
	2014	2014	2015	2016	2017
Avg. Water Surface Slope	0.0577				
Riffle Length	19				
Avg. Riffle Slope	0.0457				
Pool Length	6				
Pool to Pool Spacing	25.0				



Project Name	Martins II - Profile
Reach	UT 1 Reach 2 - Station 06+00 - 12+00
Feature	Profile
Date	4/4/14
Crew	Perkinson, Jernigan

2014 Year 0 Monitoring \Survey			2014 Year 1 Monitoring \Survey			2015 Year 2 Monitoring \Survey			2016 Year 3 Monitoring \Survey			2017 Year 4 Monitoring \Survey		
Station	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**
0.0	58.4	58.5												
33.2	59.4	59.6												
36.6	58.7	59.5												
38.2	60.4	60.5												
51.1	60.3	60.6												
54.5	61.8	61.8												
71.0	61.8	62.1												
89.4	62.3	62.4												
93.4	62.2	62.5												
96.2	62.7	62.9												
106.1	63.4	63.3												
120.8	64.3	64.5												
123.0	63.9	64.5												
129.5	63.9	64.5												
130.1	64.8	64.9												
138.9	65.0	65.4												
140.7	65.0	65.4												
144.2	65.0	65.4												
144.9	65.8	65.8												
153.0	65.8	66.0												
156.9	66.0	66.2												
158.1	65.7	66.2												
159.7	66.5	66.7												
186.0	67.6	67.9												
190.1	67.2	67.9												
191.8	68.5	68.7												
203.6	69.2	69.4												
215.3	69.6	69.9												

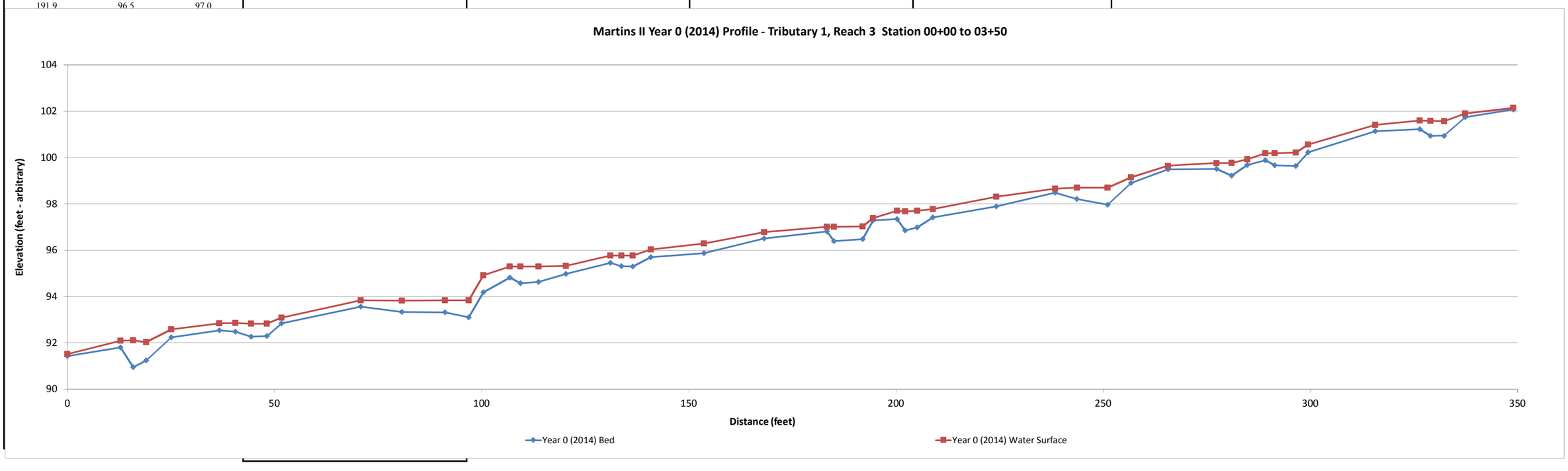
	2014	2014	2015	2016	2017
Avg. Water Surface Slope	0.0577				
Riffle Length	19				
Avg. Riffle Slope	0.0457				
Pool Length	6				
Pool to Pool Spacing	25.0				



Project Name	Martins II - Profile
Reach	UT 1 Reach 3 - Station 00+00 - 03+50
Feature	Profile
Date	4/4/14
Crew	Perkinson, Jernigan

2014 Year 0 Monitoring \Survey			2014 Year 1 Monitoring \Survey			2015 Year 2 Monitoring \Survey			2016 Year 3 Monitoring \Survey			2017 Year 4 Monitoring \Survey		
Station	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**
0.0	91.4	91.5												
12.8	91.8	92.1												
15.9	90.9	92.1												
19.0	91.2	92.0												
25.1	92.2	92.6												
36.7	92.5	92.8												
40.6	92.5	92.9												
44.4	92.3	92.8												
48.1	92.3	92.8												
51.7	92.8	93.1												
70.8	93.6	93.8												
80.8	93.3	93.8												
91.1	93.3	93.8												
96.9	93.1	93.8												
100.4	94.2	94.9												
106.8	94.8	95.3												
109.3	94.6	95.3												
113.7	94.6	95.3												
120.3	95.0	95.3												
131.1	95.4	95.8												
133.8	95.3	95.8												
136.5	95.3	95.8												
140.8	95.7	96.0												
153.6	95.9	96.3												
168.1	96.5	96.8												
183.3	96.8	97.0												
185.0	96.4	97.0												
191.9	96.5	97.0												

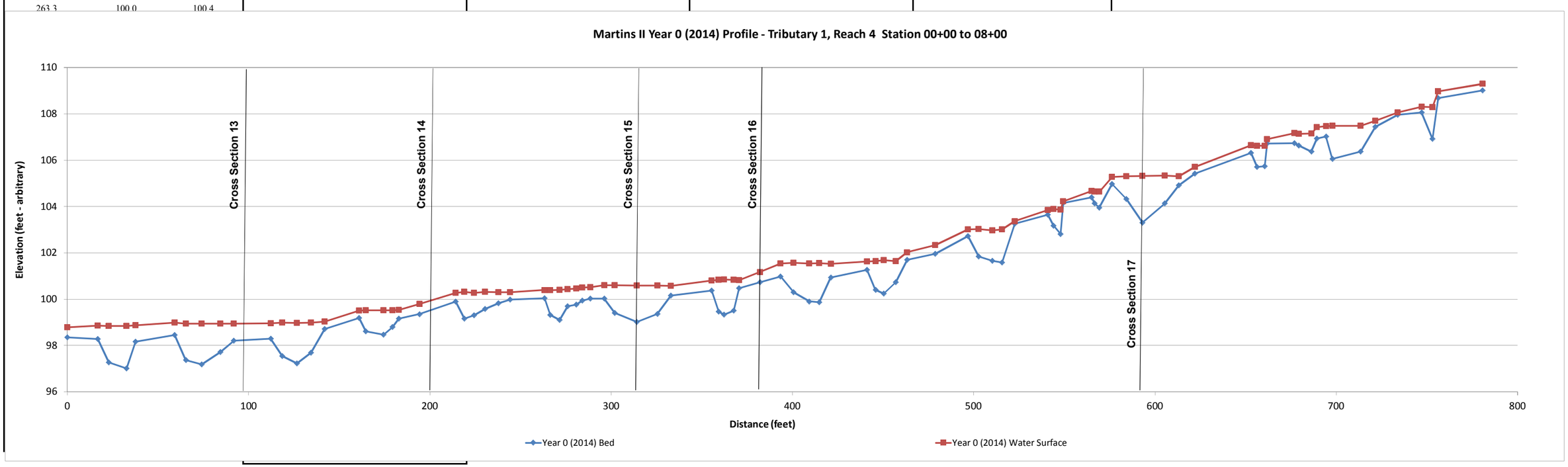
	2014	2014	2015	2016	2017
Avg. Water Surface Slope	0.0305				
Riffle Length	17				
Avg. Riffle Slope	0.0388				
Pool Length	13				
Pool to Pool Spacing	31.0				



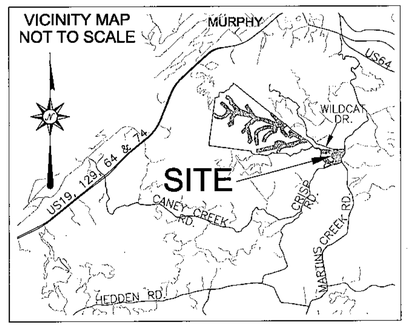
Project Name	Martins II - Profile
Reach	UT 1 Reach 4 - Station 00+00 - 08+00
Feature	Profile
Date	4/4/14
Crew	Perkinson, Jernigan

2014 Year 0 Monitoring \Survey			2014 Year 1 Monitoring \Survey			2015 Year 2 Monitoring \Survey			2016 Year 3 Monitoring \Survey			2017 Year 4 Monitoring \Survey		
Station	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**
0.0	98.3	98.8												
16.7	98.3	98.9												
22.8	97.3	98.8												
32.6	97.0	98.8												
37.5	98.2	98.9												
59.1	98.5	99.0												
65.4	97.4	98.9												
74.2	97.2	98.9												
84.5	97.7	98.9												
91.8	98.2	98.9												
112.2	98.3	99.0												
118.5	97.5	99.0												
126.6	97.2	99.0												
134.4	97.7	99.0												
142.0	98.7	99.0												
160.9	99.2	99.5												
164.7	98.6	99.5												
174.4	98.5	99.5												
179.4	98.8	99.5												
182.9	99.2	99.5												
194.3	99.4	99.8												
214.2	99.9	100.3												
219.0	99.2	100.3												
224.3	99.3	100.3												
230.4	99.6	100.3												
237.8	99.8	100.3												
244.3	100.0	100.3												
263.3	100.0	100.4												

	2014	2014	2015	2016	2017
Avg. Water Surface Slope	0.0135				
Riffle Length	21				
Avg. Riffle Slope	0.0166				
Pool Length	22				
Pool to Pool Spacing	42.0				



Appendix E.
As-built Plan Sheets



I, ELISABETH G. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THUS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 2nd DAY OF AUGUST, 2013.

ELISABETH G. TURNER, P.L.S. #L-4440

NORTH CAROLINA PROFESSIONAL SEAL L-4440 LAND SURVEYOR ELISABETH G. TURNER

REFERENCES:

OWNER:
NORTH CAROLINA ECOSYSTEM
ENHANCEMENT PROGRAM
1652 MAIL SERVICE CENTER
RALEIGH, NC 27099-1652
(919)715-1157
PROJ. MGR.: PAUL WIESNER

CONTRACTOR:
RIVER WORKS, INC.
RALEIGH, NC
(919)582-3574

DESIGNER:
MICHAEL BAKER ENGINEERING, INC.
ASHEVILLE, NC
(828)350-1408

PROPERTY OWNER:
ESTATE OF FRANCIS C. BOURNE, SR. (PATRICK CRAGO, TRUSTEE)
CONSERVATION EASEMENT
RECORDED IN DB 1394, PG 563 IN THE CHEROKEE COUNTY NC REGISTER OF DEEDS.

AS-BUILT SURVEY OF

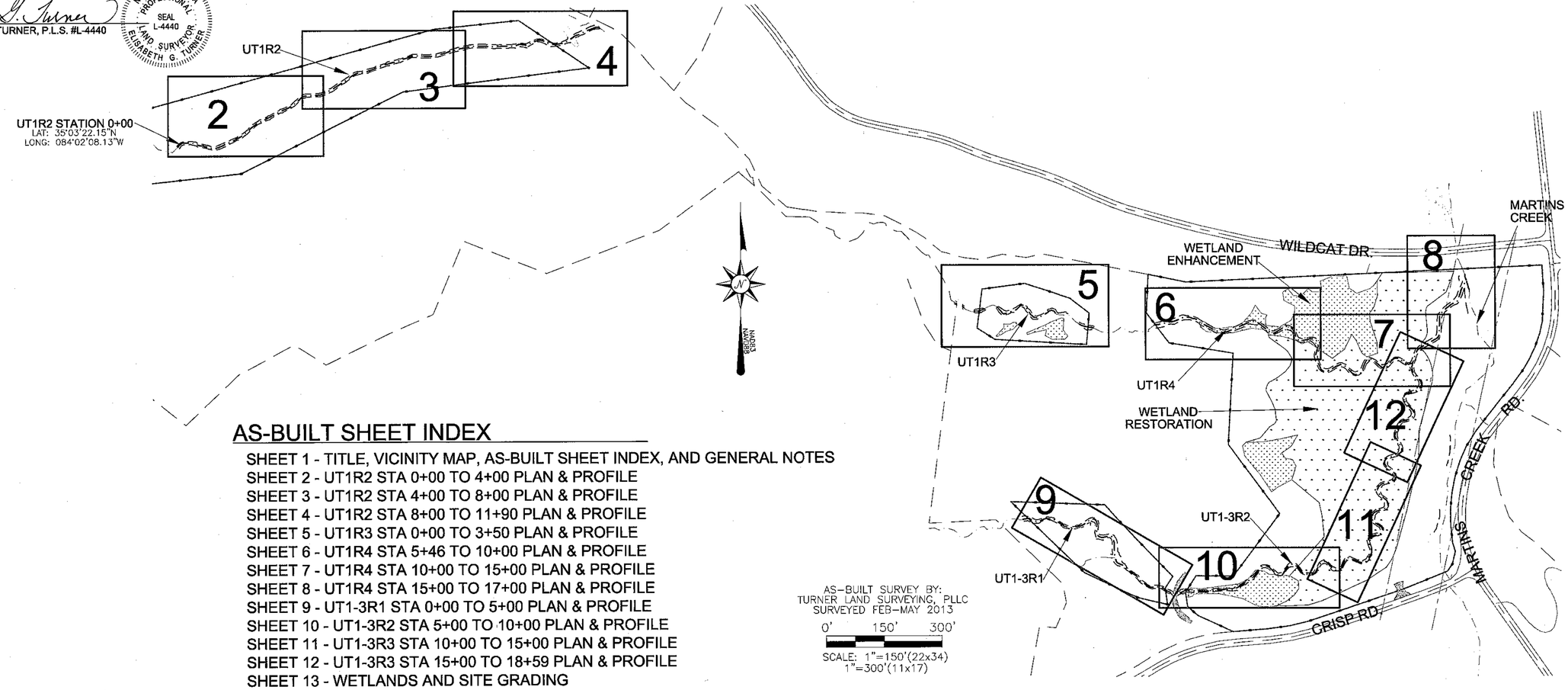
MARTINS CREEK II MITIGATION PROJECT

CHEROKEE COUNTY, NC

SCO PROJECT NO. #08-07251-01
EEP PROJECT ID #92633

GENERAL NOTES

1. ALL DISTANCES ARE HORIZONTAL UNLESS OTHERWISE NOTED.
2. THE VERTICAL DATUM IS NAVD88.
3. THE BASIS OF BEARINGS IS NCGS STATE PLANE GRID COORDINATES NAD83 (NSRS 2007) DATUM.
4. CONTROL IS BASED ON EXISTING CONTROL DATA AS SHOWN ON SHEET 17 OF THE DESIGN PLANS AND RECOVERED DURING THE CONSTRUCTION & AS-BUILT SURVEYS. ADDITIONAL CONTROL ESTABLISHED USING GPS/RTK METHODS PRIOR TO CONSTRUCTION. THE CONTROL POINTS USED DURING THE AS-BUILT SURVEY ARE LISTED ON AS-BUILT PLAN SHEET 13.
5. THIS MAP IS NOT FOR RECORDATION, SALES, OR CONVEYANCES AND DOES NOT COMPLY WITH G.S. 47-30 MAPPING REQUIREMENTS.
6. THE SOLE PURPOSE OF THIS SURVEY IS TO SHOW THE CONSTRUCTED STREAM AND THE FEATURES RELATED TO THE RESTORATION PROJECT.
7. THE 0+00 STATIONS ARE MATCHED WITH THE DESIGN 0+00 STATIONS HOWEVER THE AS-BUILT SURVEY LENGTH MAY VARY SLIGHTLY FROM THE DESIGN LENGTH.
8. FEATURES OUTSIDE THE AS-BUILT LIMITS OF DISTURBANCE INCLUDING BUT NOT LIMITED TO EXISTING UTILITIES, EASEMENTS, DRAINAGE, & PROPERTY LINES WERE NOT LOCATED BY TURNER LAND SURVEYING, PLLC. ALL FEATURES SHOWN OUTSIDE THE AS-BUILT LIMITS WERE TAKEN FROM EXISTING CONDITIONS AND DESIGN DATA PROVIDED BY THE DESIGNER.
9. CONSERVATION EASEMENT PROVIDED BY DESIGNER.
10. RIGHT PRONG AND ITS TRIBUTARIES ARE NOT INCLUDED IN THIS AS-BUILT SURVEY. PLEASE REFER TO DESIGN PLANS FOR ENTIRE PROJECT SITE PLAN AND DESIGN SUMMARY.



AS-BUILT SURVEY BY:
TURNER LAND SURVEYING, PLLC
SURVEYED FEB-MAY 2013

0' 150' 300'

SCALE: 1"=150'(22x34)
1"=300'(11x17)

AS-BUILT SHEET INDEX

REVISIONS, DATE, AND INITIAL:

TURNER LAND SURVEYING, PLLC
3201 Glenridge Drive, Raleigh, NC 27604 – (919)875-1378
P-0702 – LTurner921@att.net – Dturner119@att.net
www.TURNERLANDSURVEYING.com

TITLE, VICINITY MAP, AS-BUILT SHEET INDEX, & GENERAL NOTES

AS-BUILT SURVEY OF
MARTINS CREEK II
MITIGATION PROJECT
MURPHY
CHEROKEE COUNTY
NORTH CAROLINA

DATE:	06/18/13
SURVEYED BY:	DST/EGT
DRAWN BY:	DST/EGT
REVIEWED BY:	DST/EGT
PROJECT:	TLS-12-022
FILE:	MARTINS CREEK II _92633_AB_TLS_F
SCALE:	AS SHOWN

SHEET 1 of 13

I, ELISABETH G. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THUS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 2nd DAY OF AUGUST, 2013.

ELISABETH G. TURNER, P.L.S. #L-4440

NORTH CAROLINA PROFESSIONAL SEAL L-4440 LAND SURVEYOR ELISABETH G. TURNER

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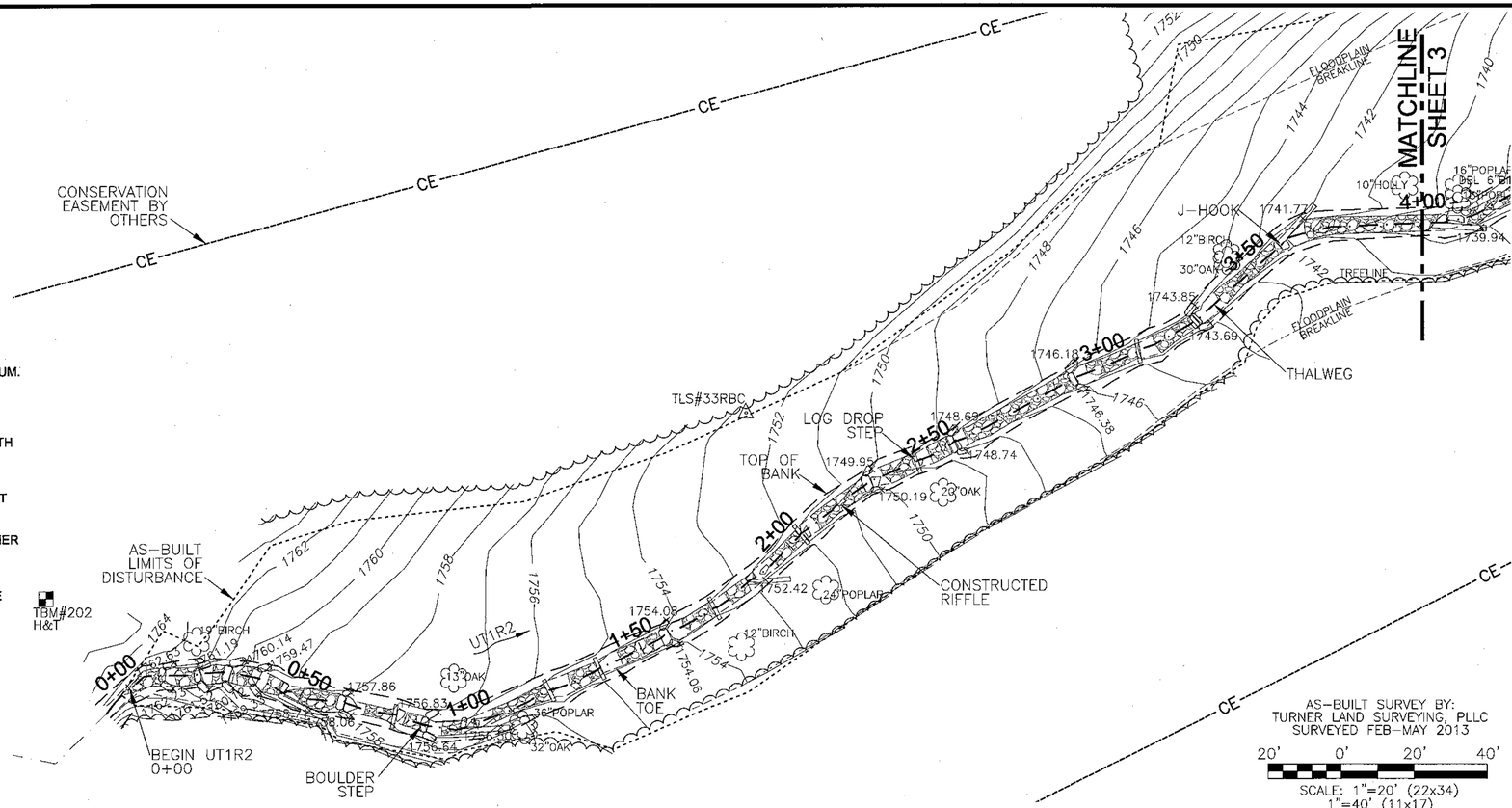
10. RIGHT PRONG AND ITS TRIBUTARIES ARE NOT INCLUDED IN THIS AS-BUILT SURVEY. PLEASE REFER TO DESIGN PLANS FOR ENTIRE PROJECT SITE PLAN AND DESIGN SUMMARY.

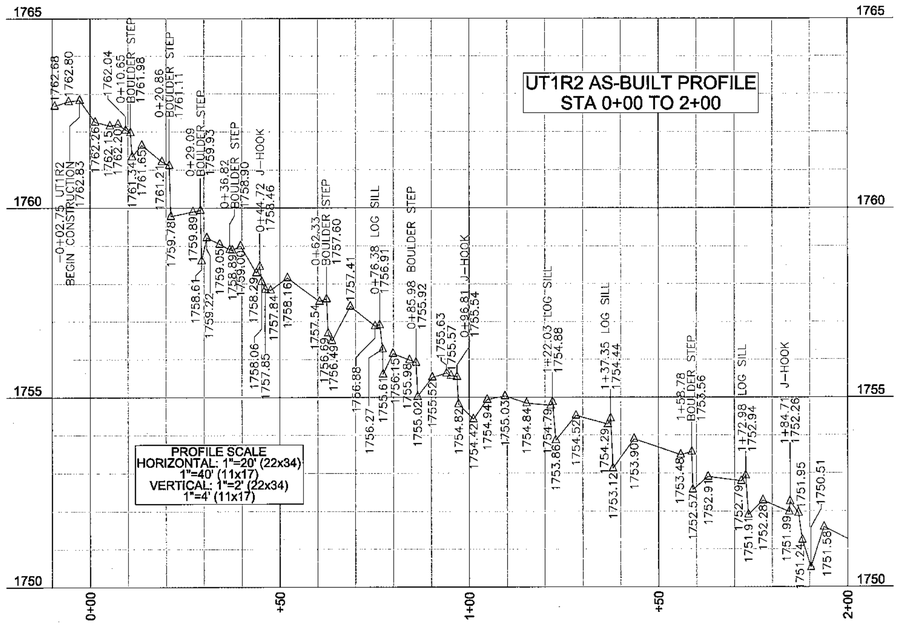
LEGEND:
- THALWEG
- EX. THALWEG
- TOP OF BANK
- BANK TOE
- AS-BUILT LOD
- CE — CONSERVATION EASEMENT (BY OTHERS)
- CONSTRUCTED RIFFLE
- STREAM CROSSING
- BEDROCK
- CONTROL PT./ BENCHMARK
- BOULDER STEP
- J-HOOK
- LOG DROP STEP
- EX. TREE
- x1595.82 STRUCTURE ELEV. AT BANK TIE IN

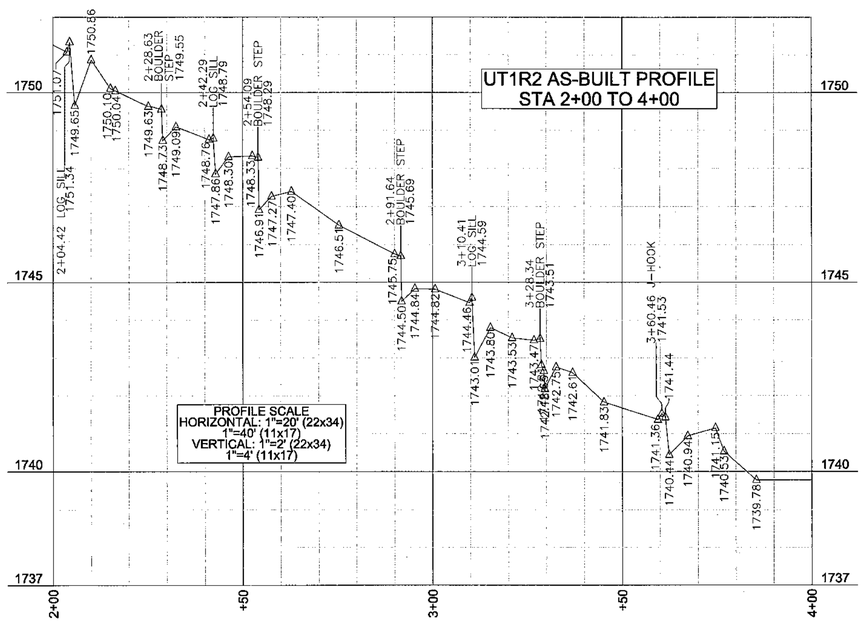


AS-BUILT SURVEY BY:
TURNER LAND SURVEYING, PLLC
SURVEYED FEB-MAY 2013

20' 0' 20' 40'

SCALE: 1"=20' (22x34)
1"=40' (11x17)
CONTOUR INTERVAL = 1'





REVISIONS, DATE, AND INITIAL:

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P-0702 – Lturner921@att.net – Dturner119@att.net
www.TURNERLANDSURVEYING.com

UT1R2 STA 0+00 TO 4+00 PLAN & PROFILE

AS-BUILT SURVEY OF
MARTINS CREEK II
MITIGATION PROJECT

MURPHY
CHEROKEE COUNTY
NORTH CAROLINA

DATE:	06/18/13
SURVEYED BY:	DST/EGT
DRAWN BY:	DST/EGT
REVIEWED BY:	DST/EGT
PROJECT:	TLS-12-022
FILE:	MARTINS CREEK II _92633_AB_TLS_F
SCALE:	AS SHOWN

SHEET
2 of 13

I, ELISABETH G. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THUS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 2nd DAY OF AUGUST, 2013.

ELISABETH G. TURNER, P.L.S. #L-4440

NORTH CAROLINA PROFESSIONAL SEAL L-4440 LAND SURVEYOR ELISABETH G. TURNER

GENERAL NOTES

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2. THE VERTICAL DATUM IS NAVD88.
3. THE BASIS OF BEARINGS IS NCGS STATE PLANE GRID COORDINATES NAD83 (NSRS 2007) DATUM.
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5. THIS MAP IS NOT FOR RECORDATION, SALES, OR CONVEYANCES AND DOES NOT COMPLY WITH G.S. 47-30 MAPPING REQUIREMENTS.
6. THE SOLE PURPOSE OF THIS SURVEY IS TO SHOW THE CONSTRUCTED STREAM AND THE FEATURES RELATED TO THE RESTORATION PROJECT.
7. THE 0+00 STATIONS ARE MATCHED WITH THE DESIGN 0+00 STATIONS HOWEVER THE AS-BUILT SURVEY LENGTH MAY VARY SLIGHTLY FROM THE DESIGN LENGTH.
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9. CONSERVATION EASEMENT PROVIDED BY DESIGNER.
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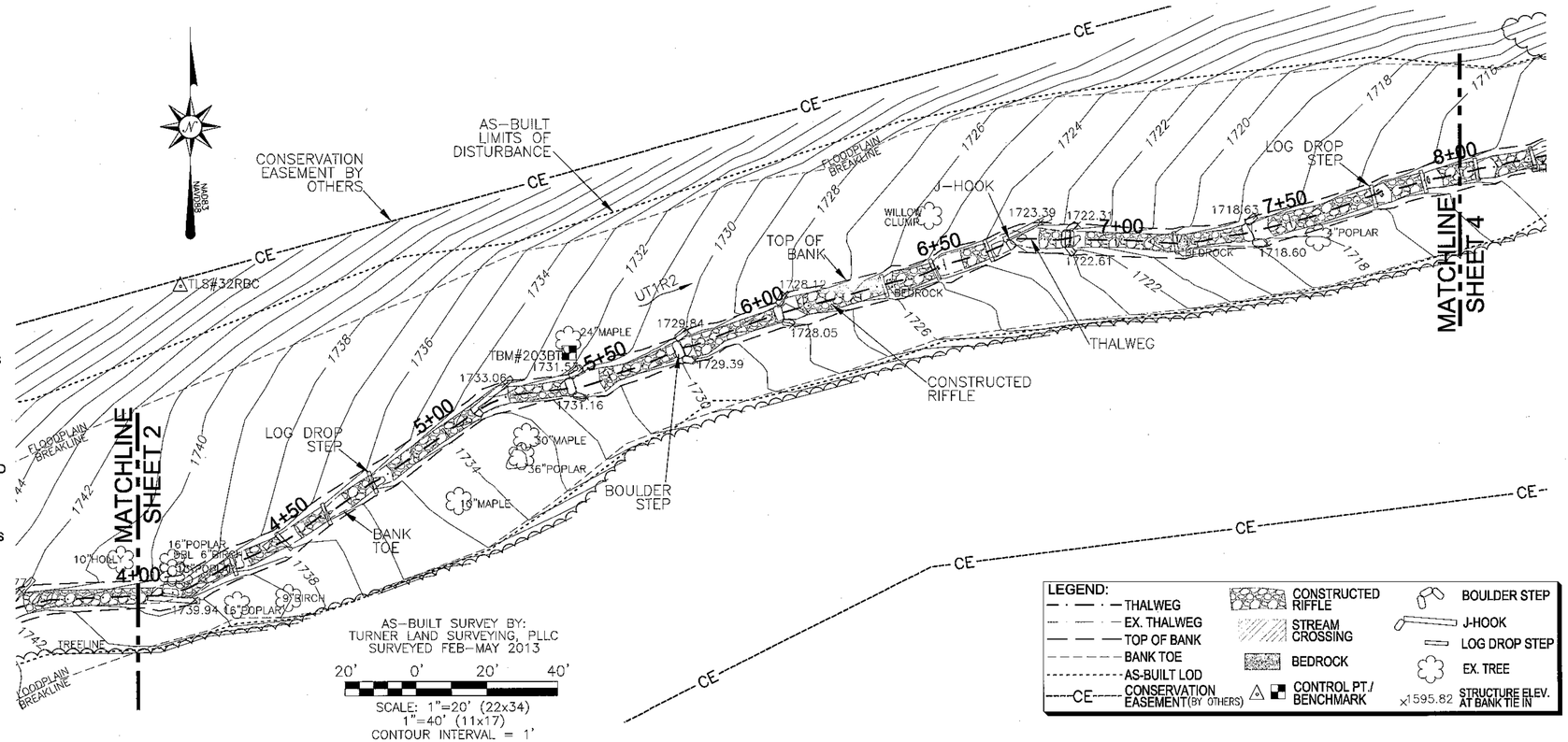

AS-BUILT SURVEY BY:
TURNER LAND SURVEYING, PLLC
SURVEYED FEB-MAY 2013

20' 0' 20' 40'

SCALE: 1"=20' (22x34)
1"=40' (11x17)
CONTOUR INTERVAL = 1'

LEGEND:
- THALWEG
- EX. THALWEG
- TOP OF BANK
- BANK TOE
- AS-BUILT LOD
- CE CONSERVATION EASEMENT (BY OTHERS)
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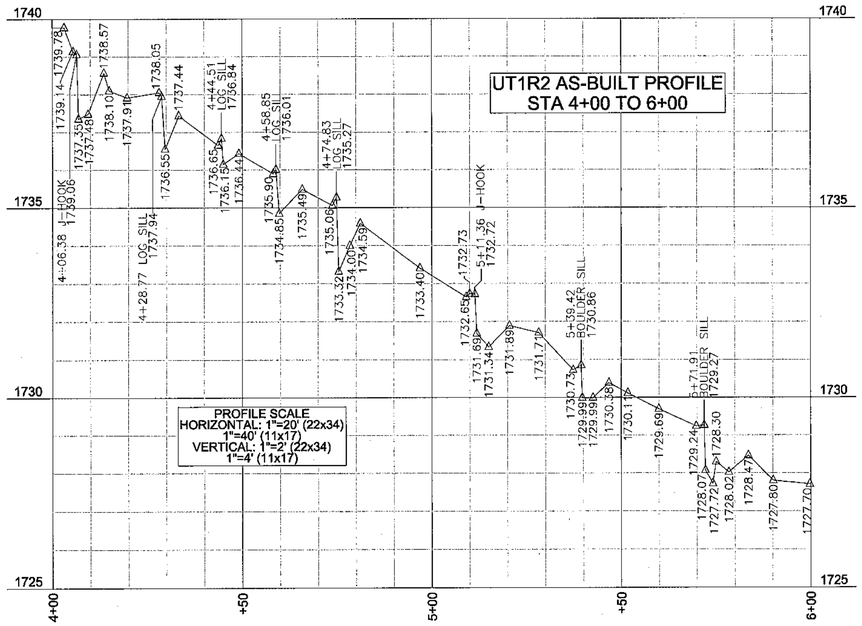

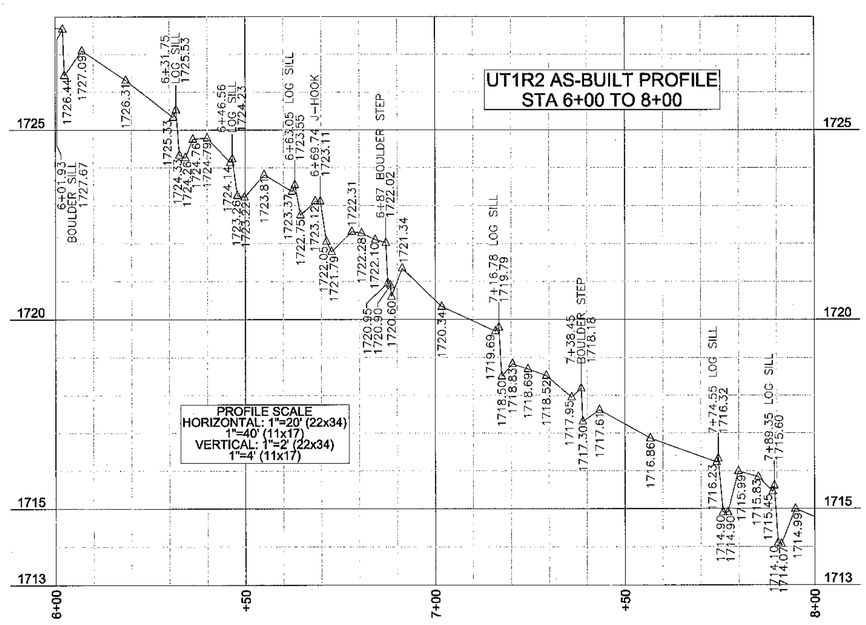

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REVISIONS, DATE, AND INITIAL:

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AS-BUILT SURVEY OF
MARTINS CREEK II
MITIGATION PROJECT
CHEROKEE COUNTY NORTH CAROLINA
MURPHY

DATE:	06/18/13
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DRAWN BY:	DST/EGT
REVIEWED BY:	DST/EGT
PROJECT:	TLS-12-022
FILE:	MARTINS CREEK II _92633_AB_TLS_F
SCALE:	AS SHOWN
SHEET	3 of 13

I, ELISABETH G. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THUS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 2nd DAY OF AUGUST, 2013.

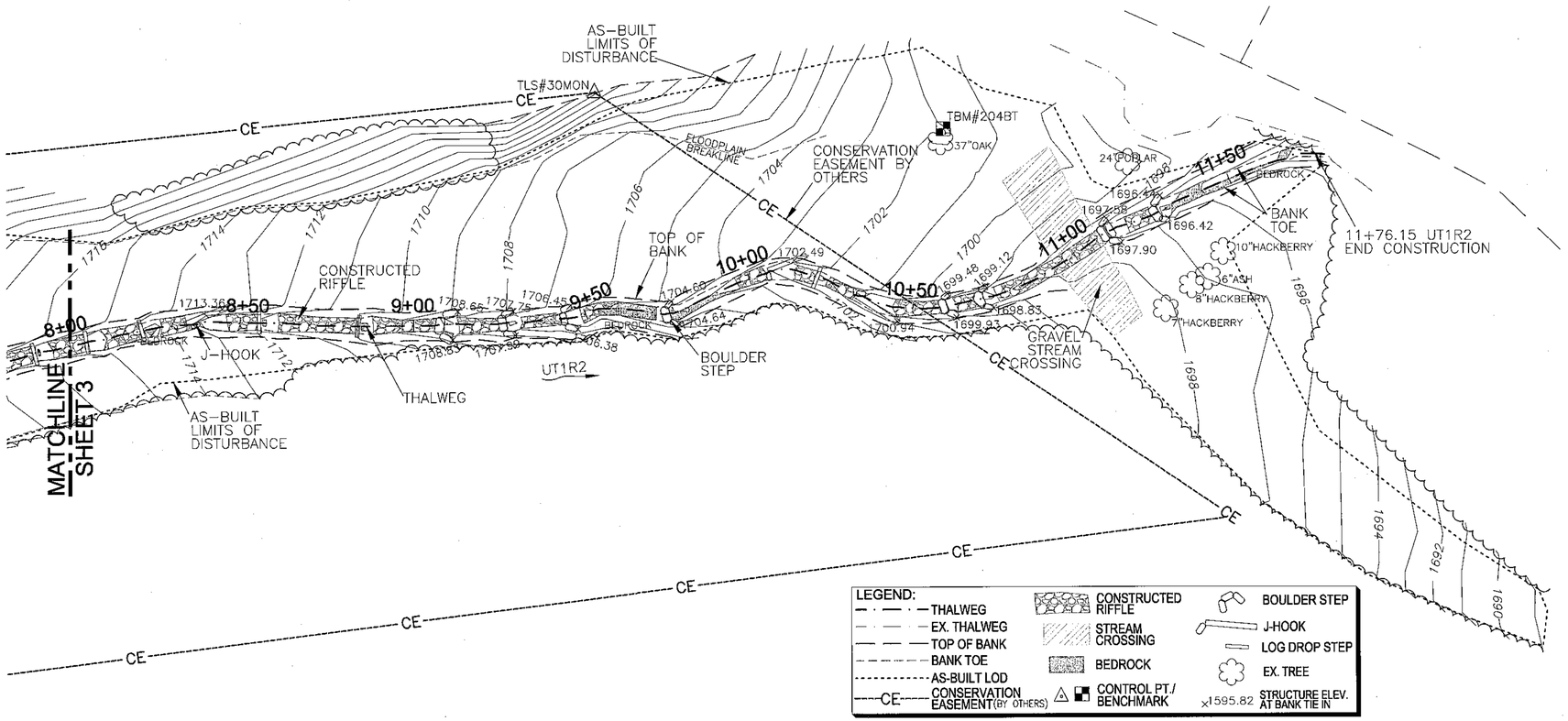
ELISABETH G. TURNER, P.L.S. #L-4440

NORTH CAROLINA PROFESSIONAL SEAL L-4440 LAND SURVEYOR ELISABETH G. TURNER

AS-BUILT SURVEY BY:
TURNER LAND SURVEYING, PLLC
SURVEYED FEB--MAY 2013

20' 0' 20' 40'

SCALE: 1"=20' (22x34)
1"=40' (11x17)
CONTOUR INTERVAL = 1'



GENERAL NOTES

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5. THIS MAP IS NOT FOR RECORDATION, SALES, OR CONVEYANCES AND DOES NOT COMPLY WITH G.S. 47-30 MAPPING REQUIREMENTS.
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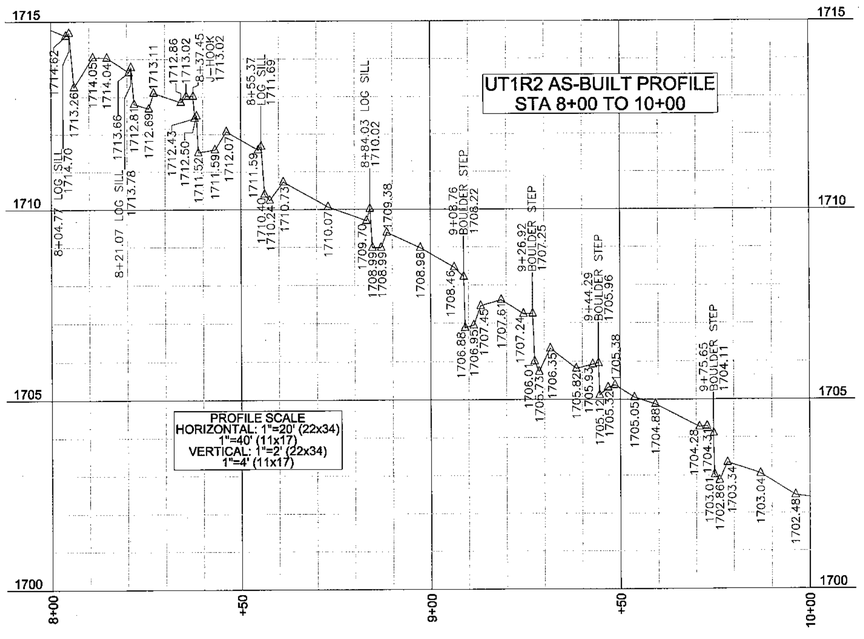

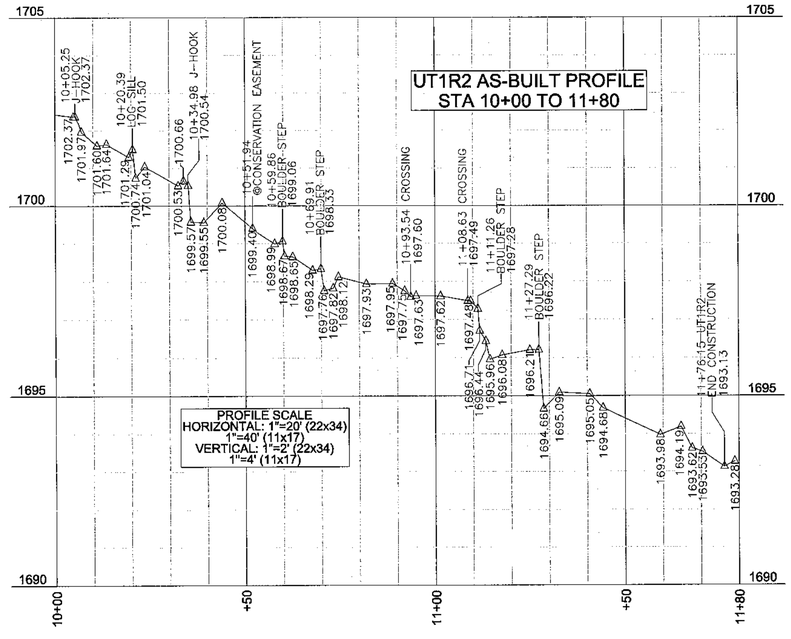

REVISIONS, DATE, AND INITIAL:

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P-0702 – Liturner921@att.net – Diurner119@att.net
www.TURNERLANDSURVEYING.com

UT1R2 STA 8+00 TO 11+80 PLAN & PROFILE

AS-BUILT SURVEY OF
MARTINS CREEK II
MITIGATION PROJECT

MURPHY
CHEROKEE COUNTY NORTH CAROLINA

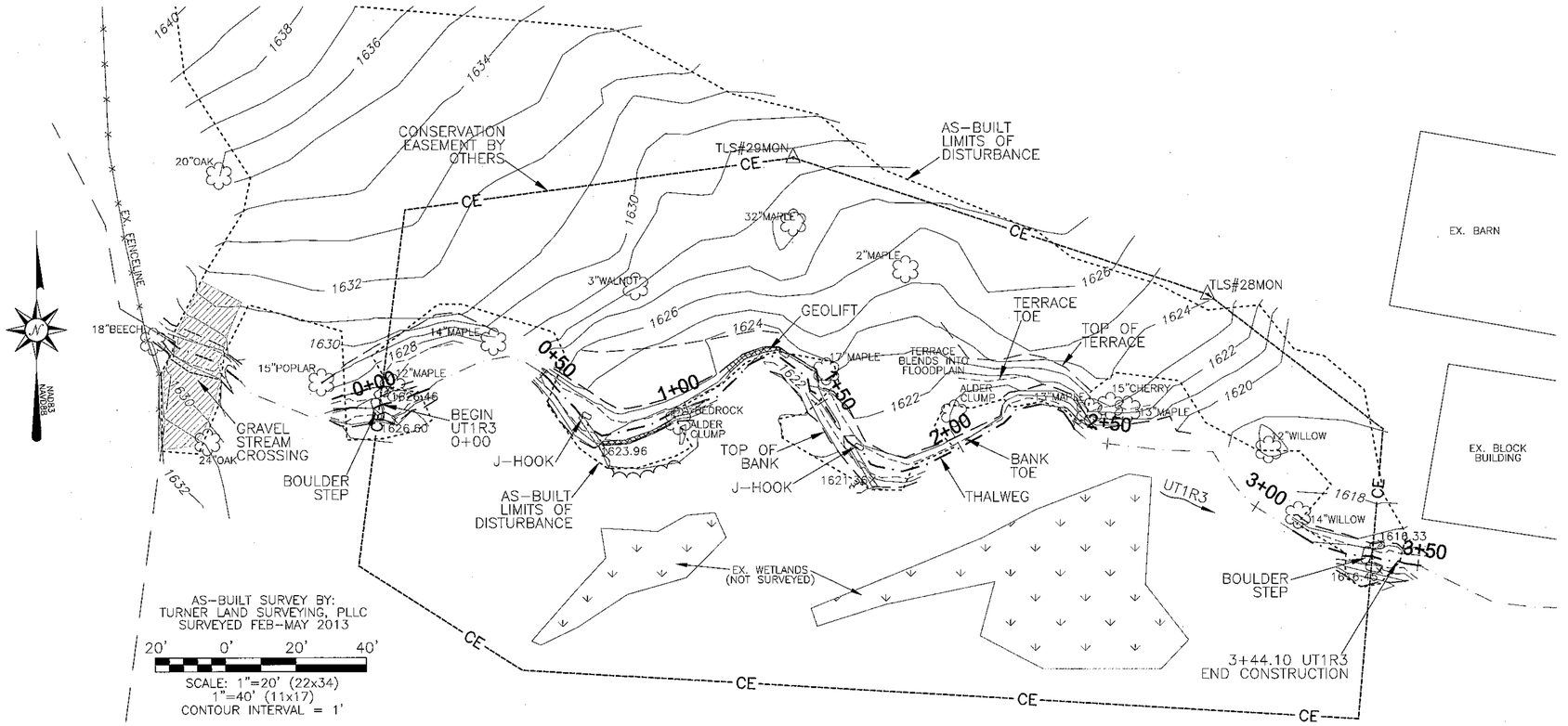
DATE:	06/18/13
SURVEYED BY:	DST/EGT
DRAWN BY:	DST/EGT
REVIEWED BY:	DST/EGT
PROJECT:	TLS-12-022
FILE:	MARTINS CREEK II _92633_AB_TLS_F
SCALE:	AS SHOWN
SHEET	4 of 13

I, ELISABETH G. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THUS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 2nd DAY OF AUGUST, 2013.

ELISABETH G. TURNER, P.L.S. #L-4440

NORTH CAROLINA PROFESSIONAL LAND SURVEYOR SEAL L-4440 ELISABETH G. TURNER

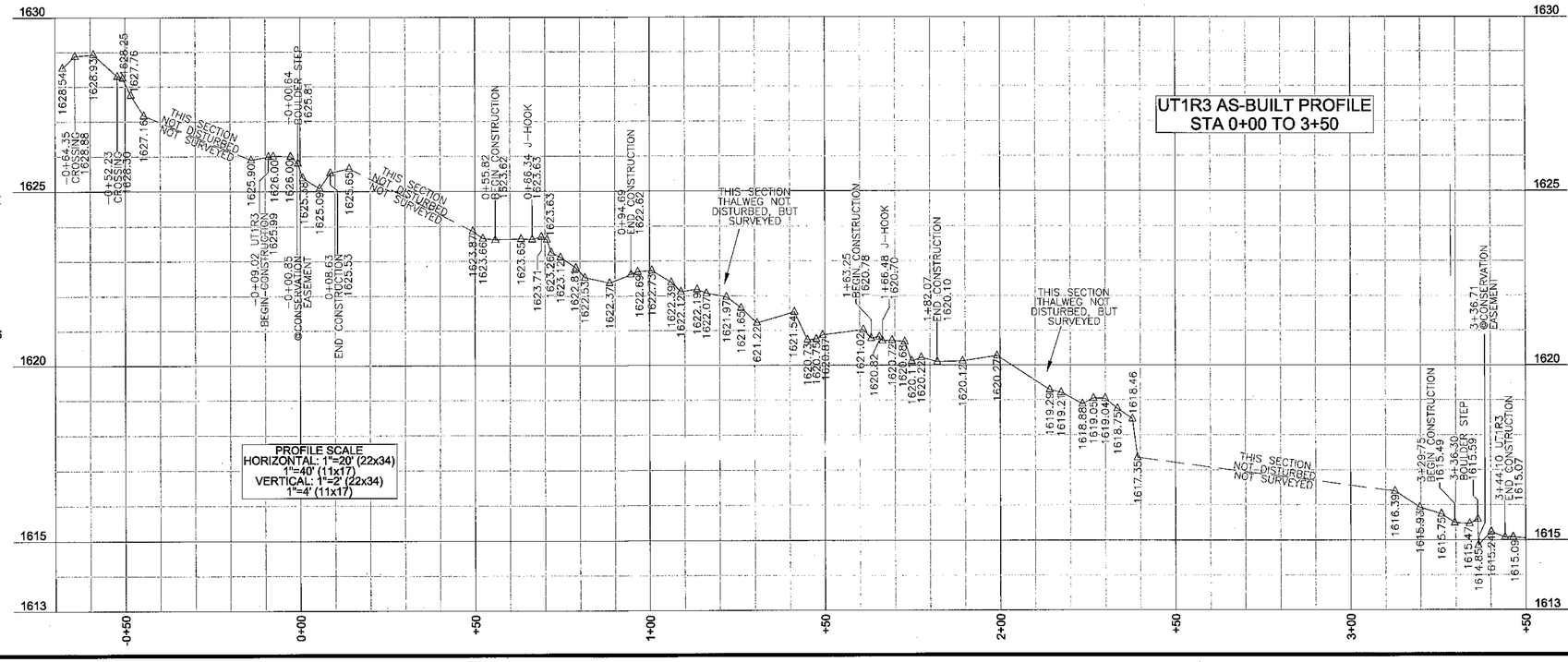
LEGEND:
- THALWEG
- EX. THALWEG
- TOP OF BANK
- BANK TOE
- AS-BUILT LOD
- CE — CONSERVATION EASEMENT (BY OTHERS)
- POWER EASEMENT
- OHE — OVERHEAD WIRE
- LOG VANE
- BOULDER STEP
- J-HOOK
- LOG DROP STEP
- ROOTWAD
- x1595.82 STRUCTURE ELEV. AT BANK TIE IN
- CONSTRUCTED RIFFLE
- STREAM CROSSING
- EX. WETLANDS
- CONTROL PT./ BENCHMARK
- EX. TREE
- BEDROCK
- GEOLIFT
- TOE WOOD
- COVER LOGS
- LUNKER BUNKER



AS-BUILT SURVEY BY:
TURNER LAND SURVEYING, PLLC
SURVEYED FEB-MAY 2013

20' 0' 20' 40'

SCALE: 1"=20' (22x34)
1"=40' (11x17)
CONTOUR INTERVAL = 1'



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2. THE VERTICAL DATUM IS NAVD88.
3. THE BASIS OF BEARINGS IS NCGS STATE PLANE GRID COORDINATES NAD83 (NSRS 2007) DATUM.
4. CONTROL IS BASED ON EXISTING CONTROL DATA AS SHOWN ON SHEET 17 OF THE DESIGN PLANS AND RECOVERED DURING THE CONSTRUCTION & AS-BUILT SURVEYS. ADDITIONAL CONTROL ESTABLISHED USING GPS/RTK METHODS PRIOR TO CONSTRUCTION. THE CONTROL POINTS USED DURING THE AS-BUILT SURVEY ARE LISTED ON AS-BUILT PLAN SHEET 13.
5. THIS MAP IS NOT FOR RECORDATION, SALES, OR CONVEYANCES AND DOES NOT COMPLY WITH G.S. 47-30 MAPPING REQUIREMENTS.
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UT1R3 STA 0+00 TO 3+50 PLAN & PROFILE

AS-BUILT SURVEY OF
MARTINS CREEK II
MITIGATION PROJECT

MURPHY
CHEROKEE COUNTY
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SCALE:	AS SHOWN
SHEET	5 of 13

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ELISABETH G. TURNER, P.L.S. #L-4440

NORTH CAROLINA PROFESSIONAL SEAL L-4440 LAND SURVEYOR ELISABETH G. TURNER

NAD83 NORTHING

LEGEND:

- THALWEG
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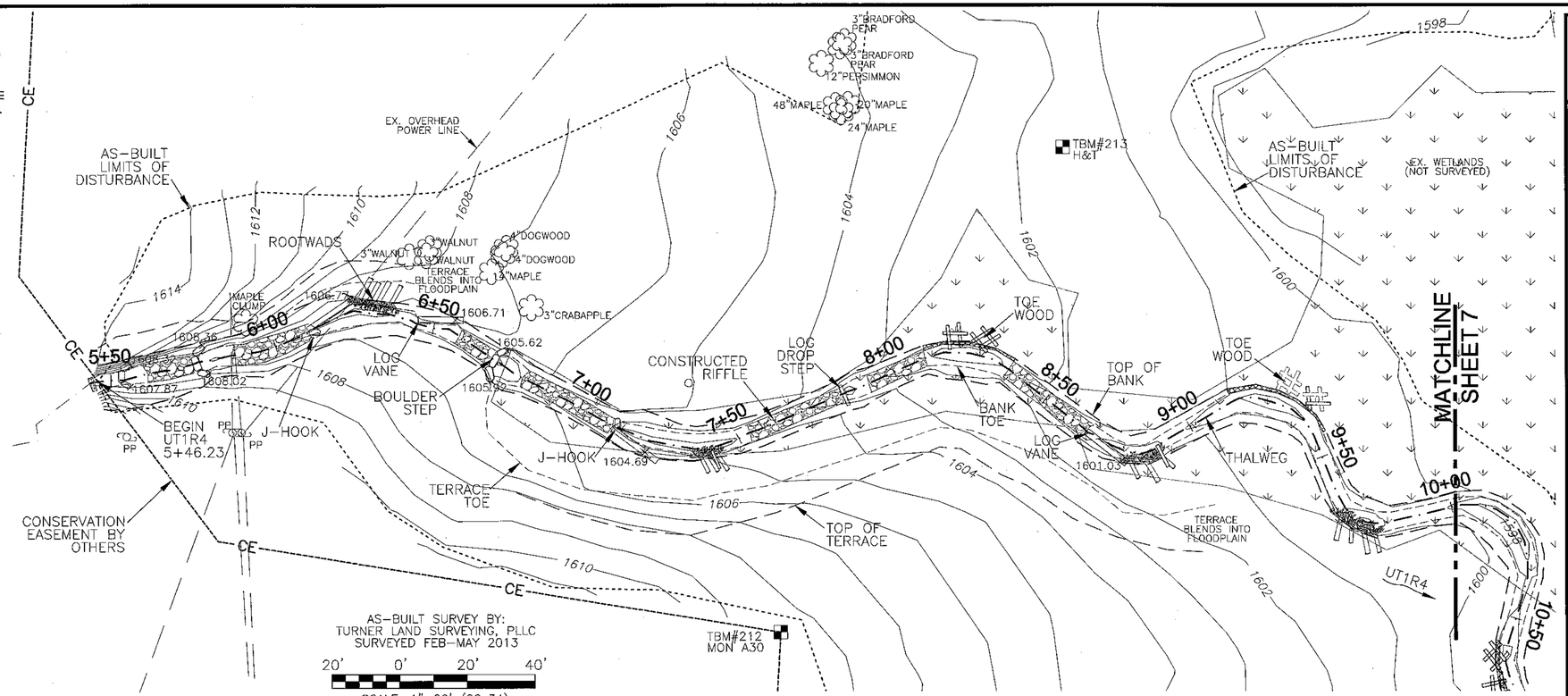

AS-BUILT SURVEY BY:
TURNER LAND SURVEYING, PLLC
SURVEYED FEB–MAY 2013

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SCALE: 1"=20' (22x34)
1"=40' (11x17)
CONTOUR INTERVAL = 1'

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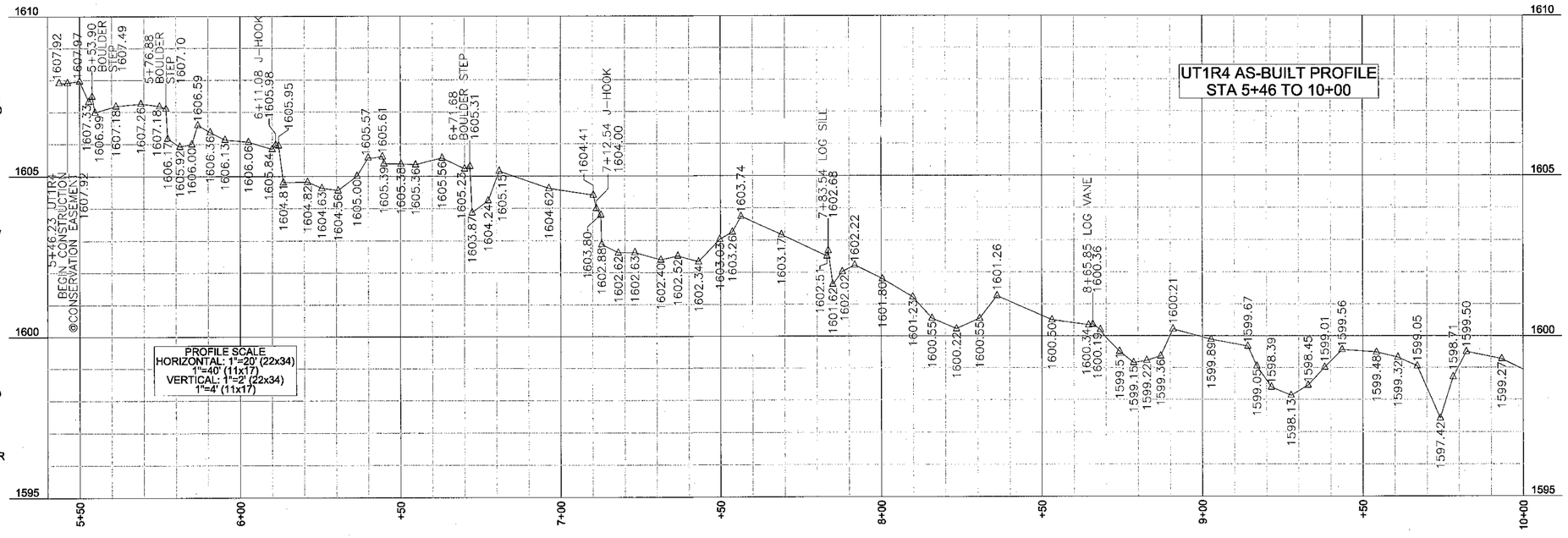

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REVISIONS, DATE, AND INITIAL:

UT1R4 STA 5+46 TO 10+00 PLAN & PROFILE

AS-BUILT SURVEY OF
MARTINS CREEK II
MITIGATION PROJECT

MURPHY

CHEROKEE COUNTY NORTH CAROLINA

DATE:	06/18/13
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DRAWN BY:	DST/EGT
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FILE:	MARTINS CREEK II _92633_AB_TLS_F
SCALE:	AS SHOWN
SHEET	6 of 13

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ELISABETH G. TURNER, P.L.S. #L-4440

NORTH CAROLINA PROFESSIONAL SEAL L-4440 LAND SURVEYOR ELISABETH G. TURNER

NAD83 (NSRS 2007)

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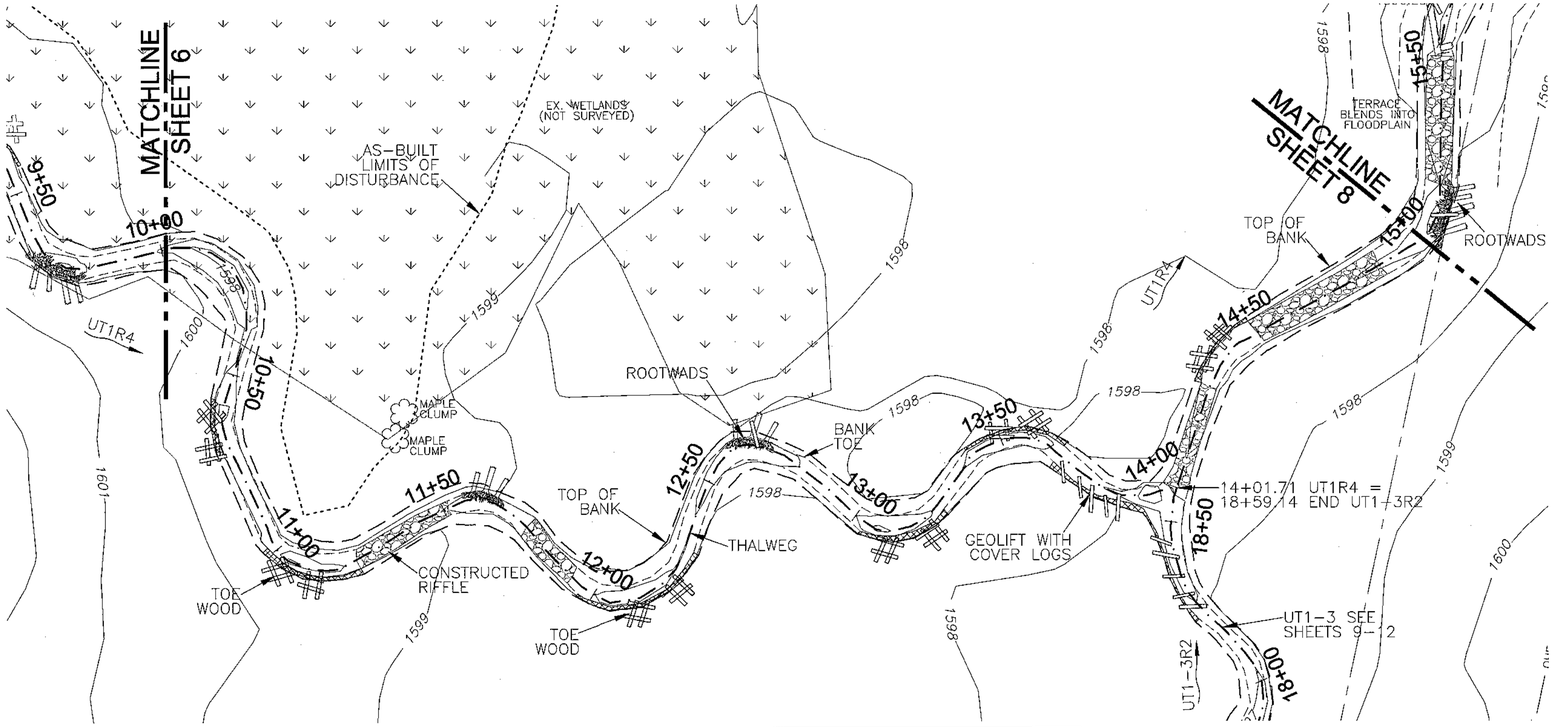

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- EX. THALWEG
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AS-BUILT SURVEY BY:
TURNER LAND SURVEYING, PLLC
SURVEYED FEB-MAY 2013

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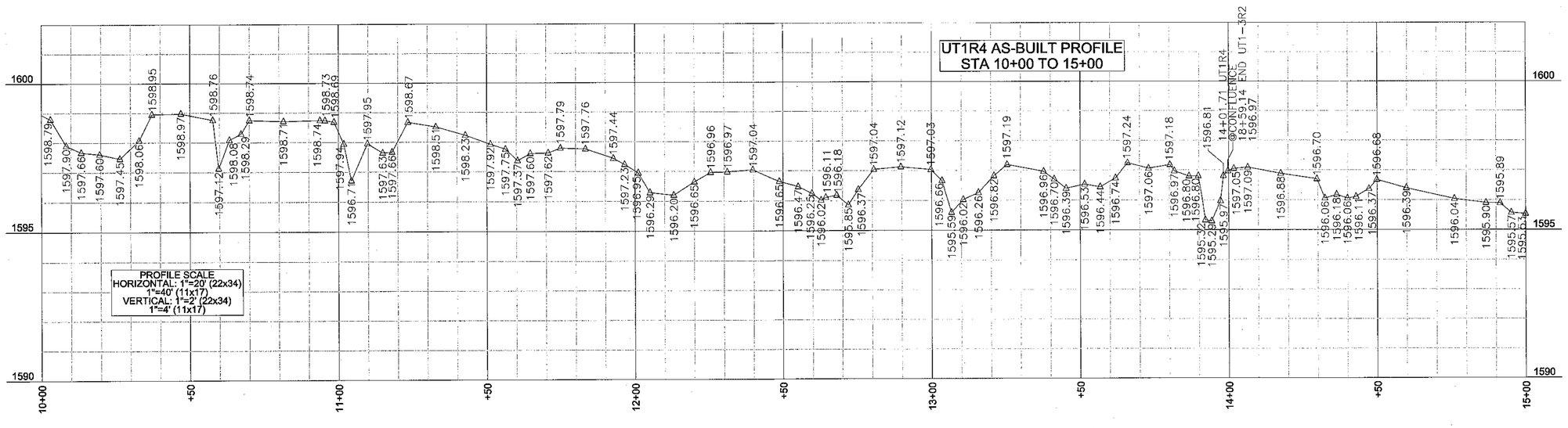

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REVISIONS, DATE, AND INITIAL:

UT1R4 STA 10+00 TO 15+00 PLAN & PROFILE

AS-BUILT SURVEY OF
MARTINS CREEK II
MITIGATION PROJECT
MURPHY
CHEROKEE COUNTY
NORTH CAROLINA

DATE: 06/18/13
SURVEYED BY: DST/EGT
DRAWN BY: DST/EGT
REVIEWED BY: DST/EGT
PROJECT: TLS-12-022
FILE: MARTINS CREEK II _92633_AB_TLS_F
SCALE: AS SHOWN

SHEET 7 of 13

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NORTH CAROLINA PROFESSIONAL SEAL L-4440 LAND SURVEYOR ELISABETH G. TURNER

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AS-BUILT SURVEY BY:
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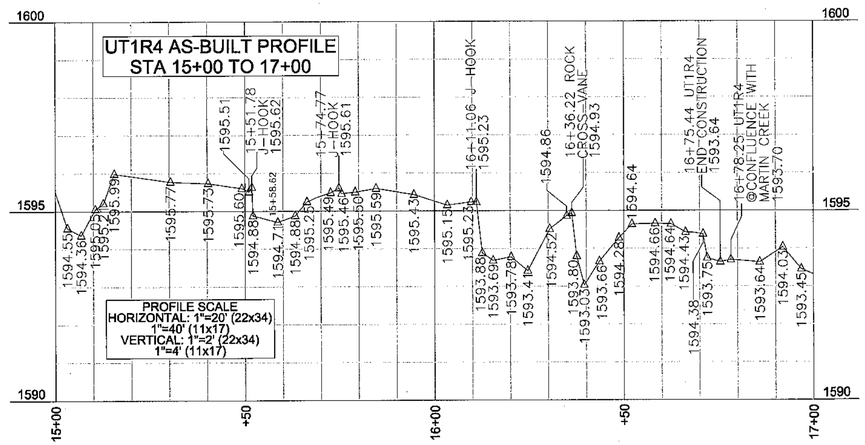

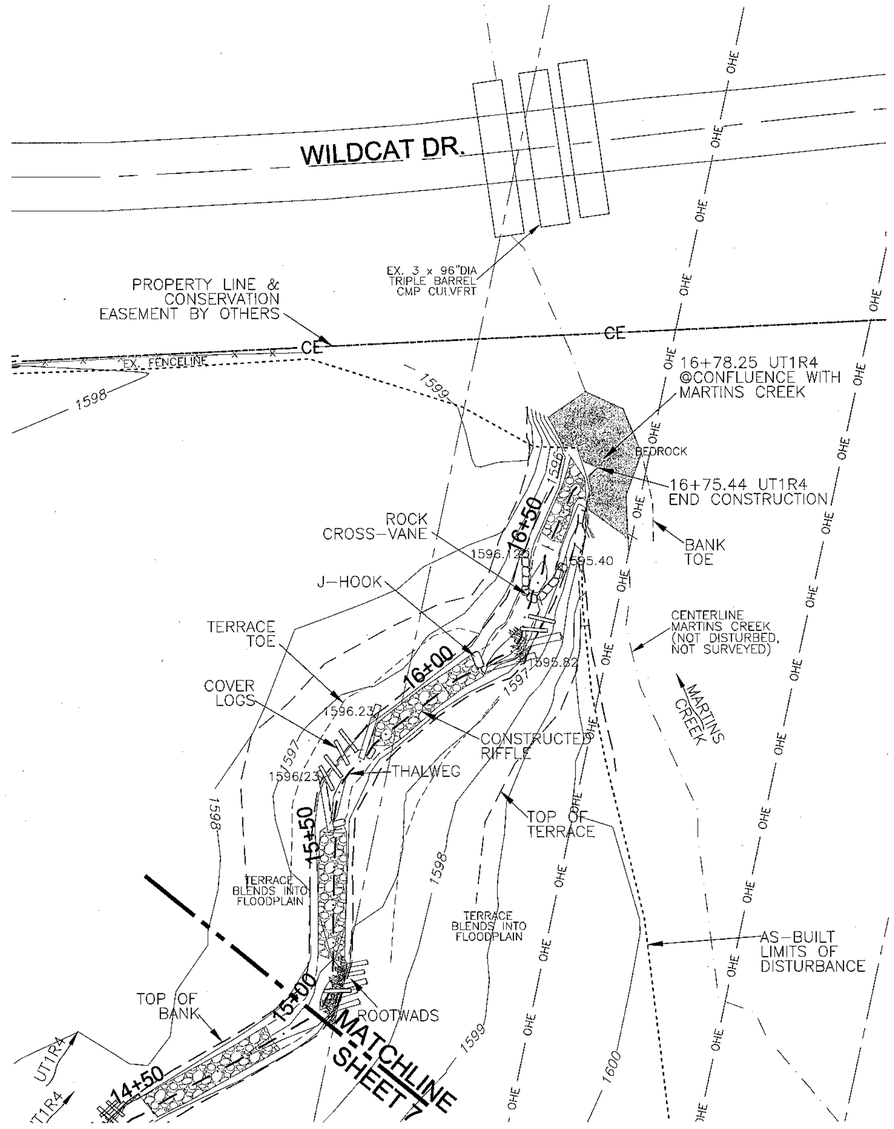

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SHEET
8 of 13

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NORTH CAROLINA PROFESSIONAL SEAL L-4440 LAND SURVEYOR ELISABETH G. TURNER

NOTES
1. SEE SHEET 1 FOR GENERAL NOTES.

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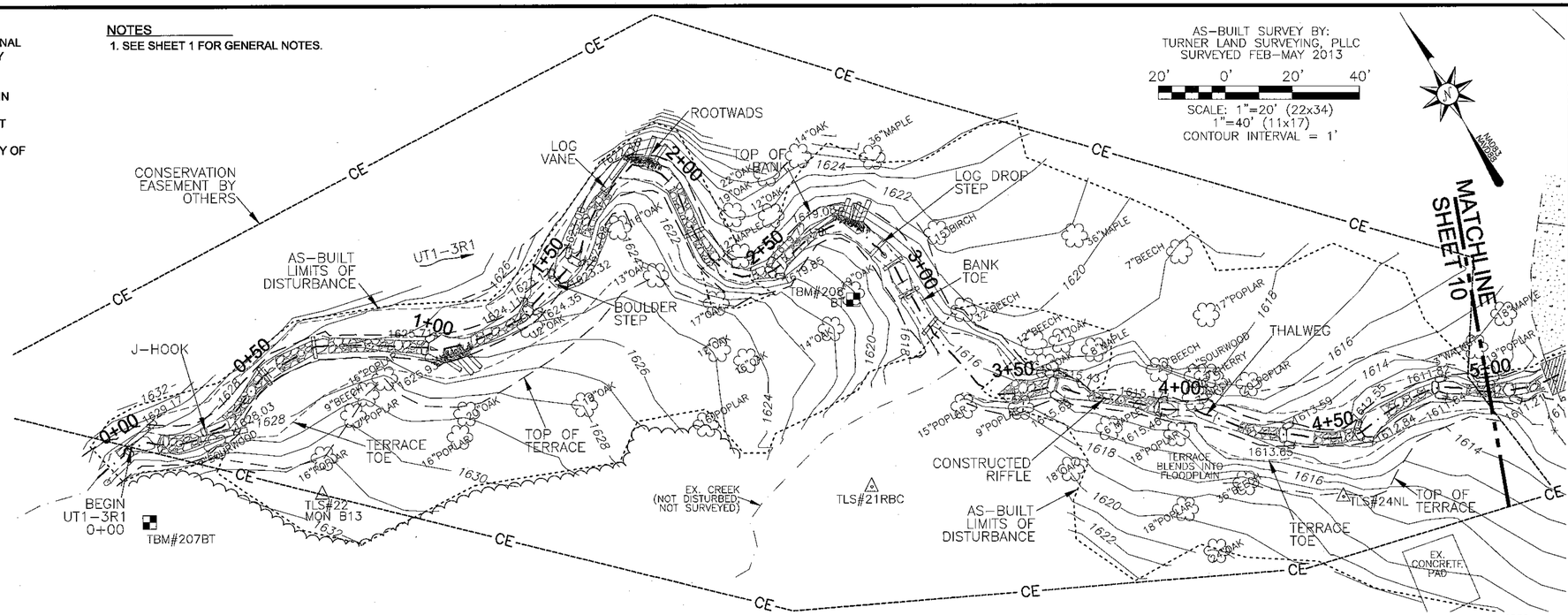

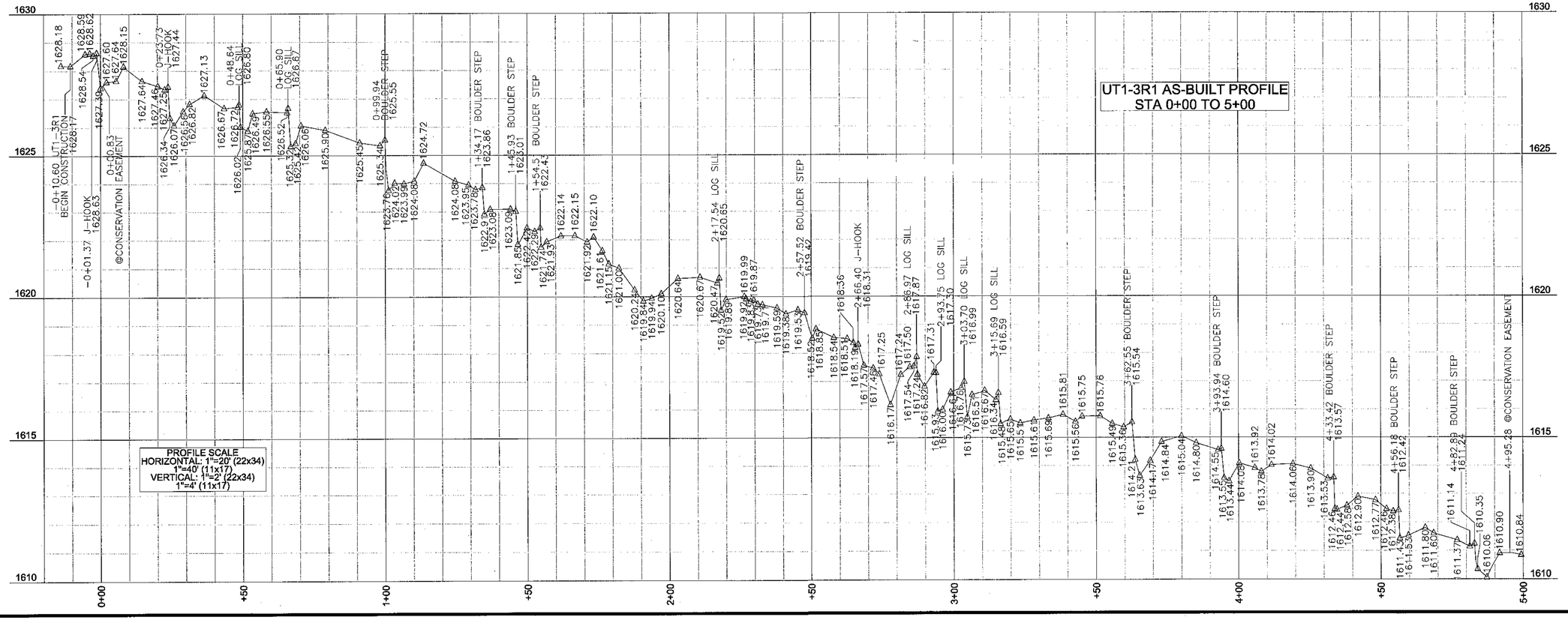

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1"=40' (11x17)
CONTOUR INTERVAL = 1'

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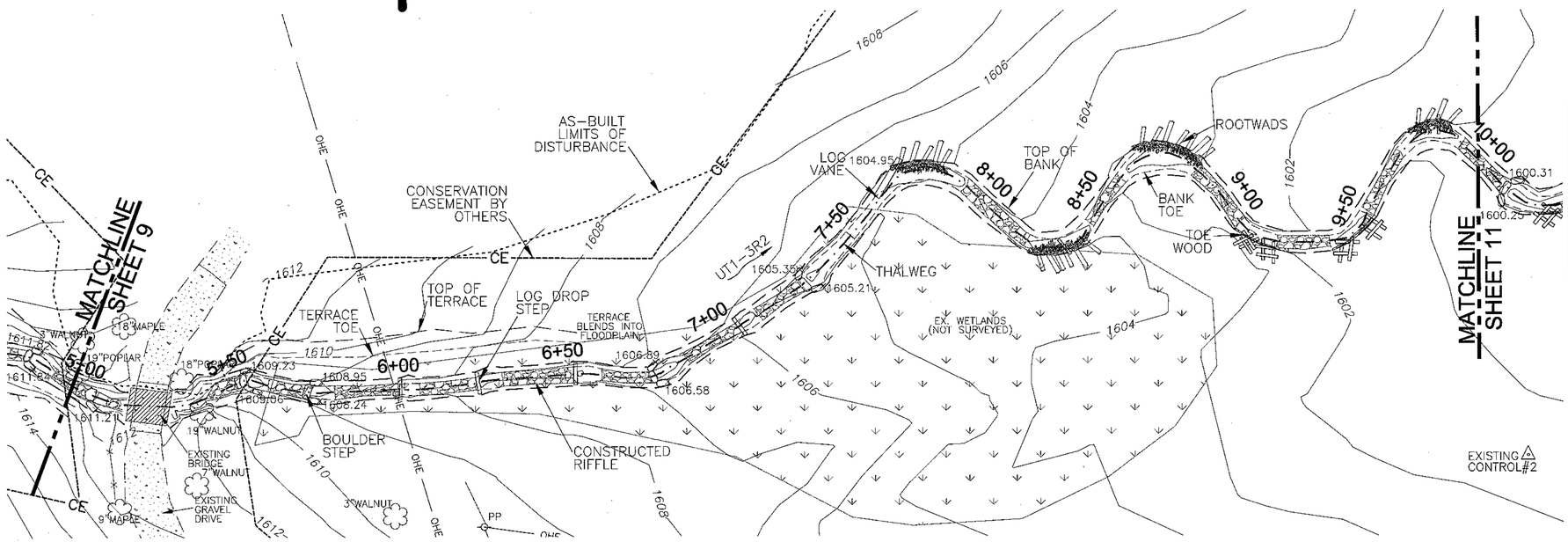

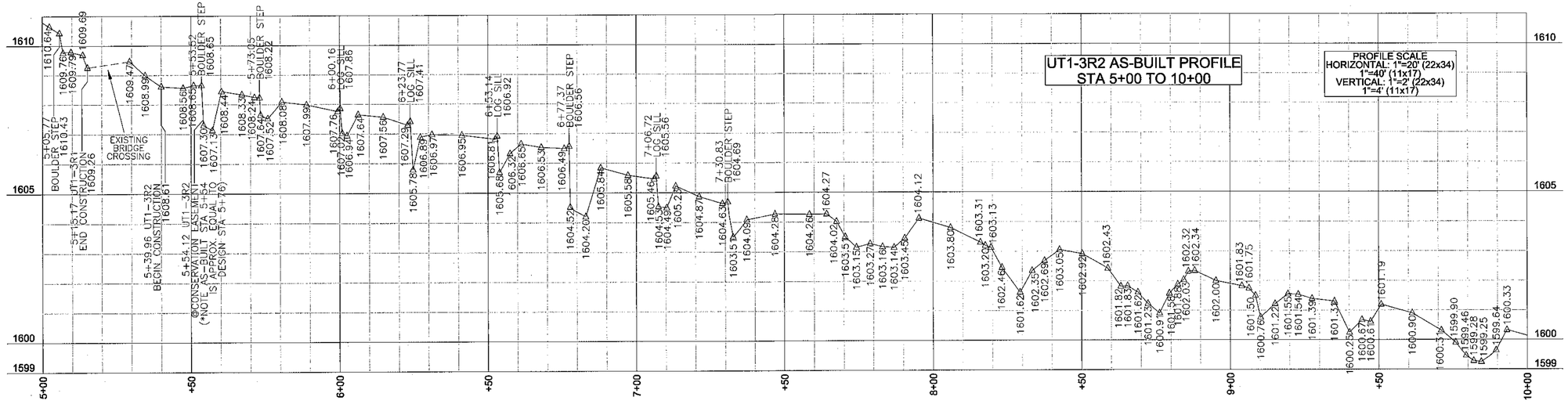

REVISIONS, DATE, AND INITIAL:

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P-0702 – Lturner921@att.net – DTurner119@att.net
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AS-BUILT SURVEY OF
MARTINS CREEK II
MITIGATION PROJECT
MURPHY
CHEROKEE COUNTY NORTH CAROLINA

UT1-3R2 STA 5+00 TO 10+00 PLAN & PROFILE

DATE:	06/18/13
SURVEYED BY:	DST/EGT
DRAWN BY:	DST/EGT
REVIEWED BY:	DST/EGT
PROJECT:	TLS-12-022
FILE:	MARTINS CREEK II _92633_AB_TLS_F
SCALE:	AS SHOWN

SHEET 10 of 13

I, ELISABETH G. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THUS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 2nd DAY OF AUGUST, 2013.

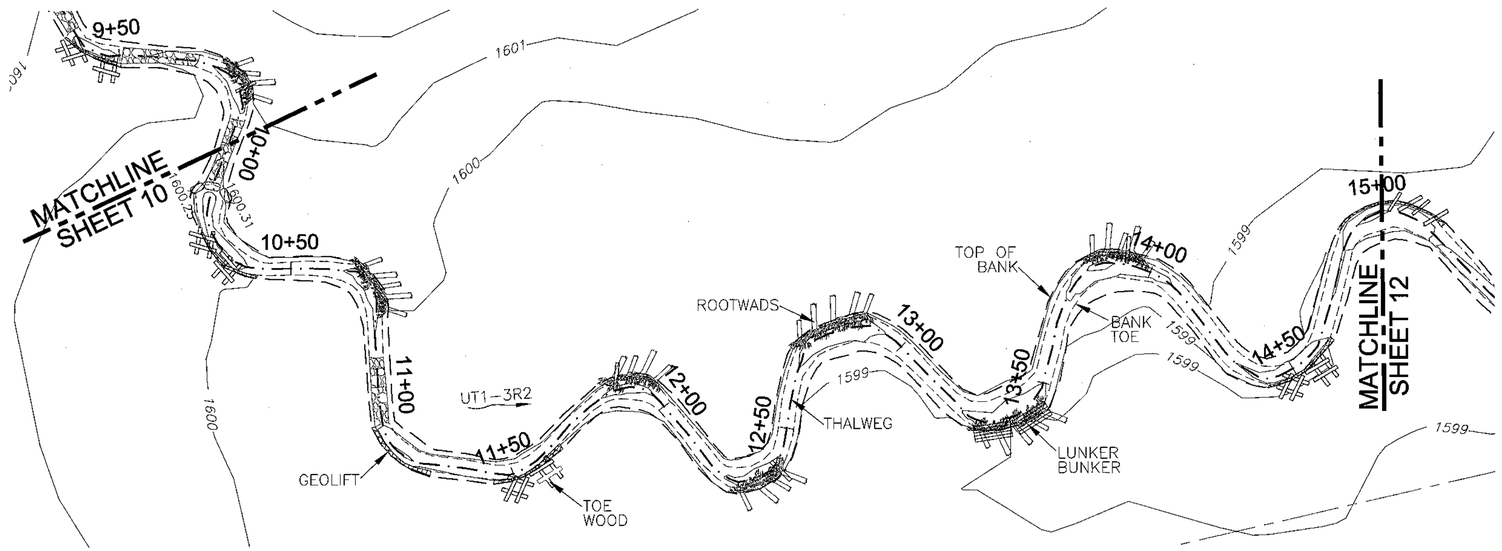
ELISABETH G. TURNER, P.L.S. #L-4440

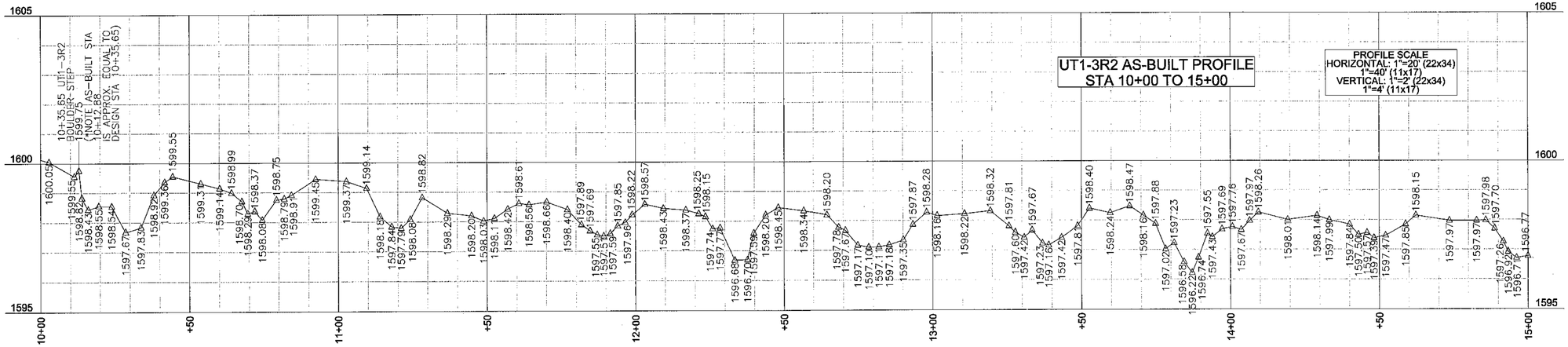
NORTH CAROLINA PROFESSIONAL SEAL L-4440 LAND SURVEYOR ELISABETH G. TURNER

AS-BUILT SURVEY BY:
TURNER LAND SURVEYING, PLLC
SURVEYED FEB-MAY 2013

20' 0' 20' 40'
SCALE: 1"=20' (22x34)
1"=40' (11x17)
CONTOUR INTERVAL = 1'

LEGEND:
- THALWEG
- EX. THALWEG
- TOP OF BANK
- BANK TOE
- AS-BUILT LOD
- CE CONSERVATION EASEMENT(BY OTHERS)
- POWER EASEMENT
- OHE OVERHEAD WIRE
- CONSTRUCTED RIFFLE
- STREAM CROSSING
- EX. WETLANDS
- CONTROL PT./ BENCHMARK
- 1595.82 STRUCTURE ELEV. AT BANK TIE IN
- BEDROCK
- LOG VANE
- BOULDER STEP
- J-HOOK
- LOG DROP STEP
- ROOTWAD
- EX. TREE
- GEOLIFT
- TOE WOOD
- COVER LOGS
- LUNKER BUNKER





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UT1-3R2 STA 10+00 TO 15+00 PLAN & PROFILE

AS-BUILT SURVEY OF
MARTINS CREEK II
MITIGATION PROJECT

CHEROKEE COUNTY MURPHY NORTH CAROLINA

DATE:	06/18/13
SURVEYED BY:	DST/EGT
DRAWN BY:	DST/EGT
REVIEWED BY:	DST/EGT
PROJECT:	TLS-12-022
FILE:	MARTINS CREEK II _92633_AB_TLS_F
SCALE:	AS SHOWN

SHEET 11 of 13

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ELISABETH G. TURNER, P.L.S. #L-4440

NORTH CAROLINA PROFESSIONAL LAND SURVEYOR ELISABETH G. TURNER SEAL L-4440

LEGEND:

- THALWEG
- EX. THALWEG
- TOP OF BANK
- BANK TOE
- AS-BUILT LOD
- CE CONSERVATION EASEMENT (BY OTHERS)
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- TOE WOOD
- COVER LOGS
- LUNKER BUNKER

AS-BUILT SURVEY BY:
TURNER LAND SURVEYING, PLLC
SURVEYED FEB-MAY 2013

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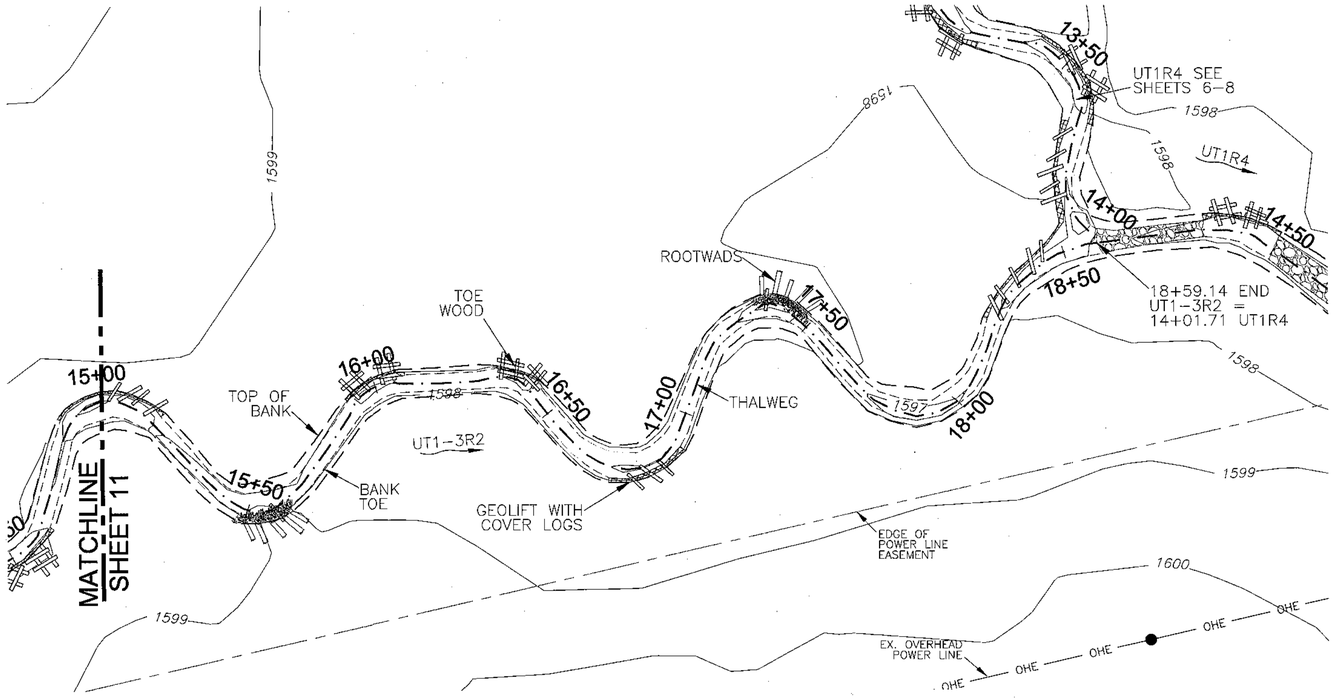

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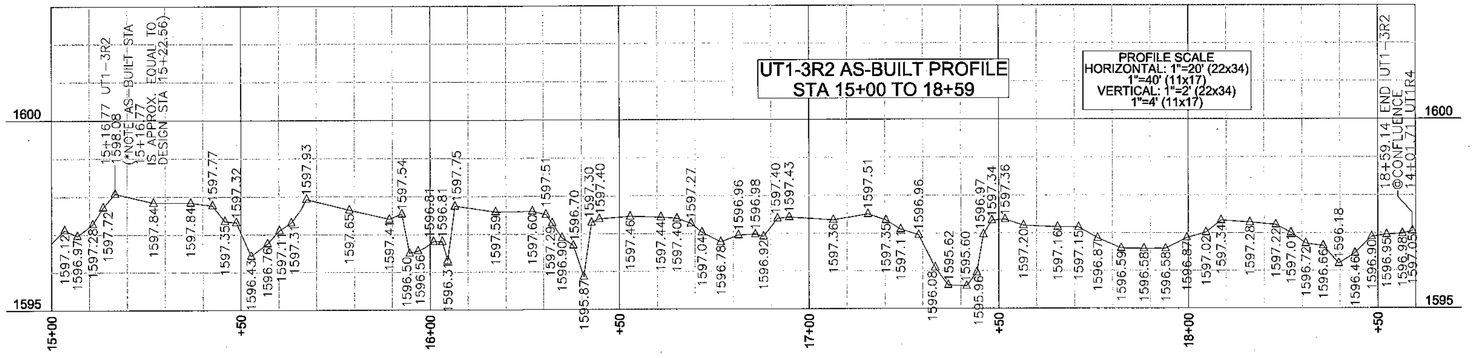

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UT1-3R2 STA 15+00 TO 18+59 PLAN & PROFILE

AS-BUILT SURVEY OF
MARTINS CREEK II
MITIGATION PROJECT

MURPHY

CHEROKEE COUNTY NORTH CAROLINA

DATE:	06/18/13
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DRAWN BY:	DST/EGT
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SHEET
12 of 13

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- TOP OF BANK
- AS-BUILT LOD
- CONSERVATION EASEMENT (BY OTHERS)
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- OVERHEAD WIRE
- CONTROL PT./ BENCHMARK
- EX. WETLANDS
- PROPOSED WETLANDS

NORTH (GRID) NAD83

AS-BUILT SURVEY BY:
TURNER LAND SURVEYING, PLLC
SURVEYED FEB-MAY 2013

50' 0' 50' 100'

SCALE: 1"=50' (22x34)
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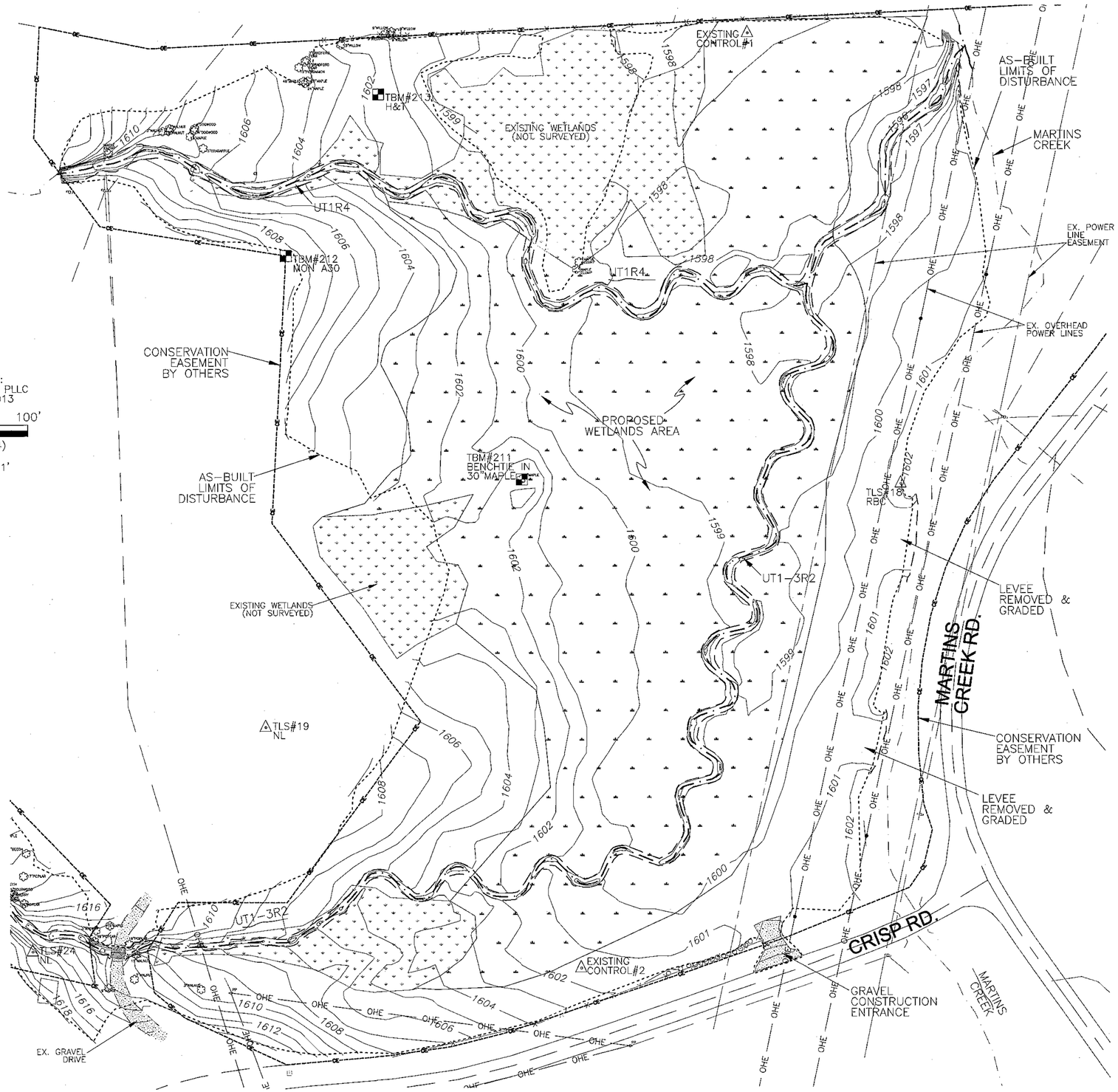

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AS-BUILT CONTROL:

PT#	Northing(Y)	Easting(X)	Elev(Z)	Description
1	513224.52	496842.99	1597.66	EX. GPS1
2	512387.66	496691.55	1601.38	EX. GPS2
18	512821.39	496978.39	1601.94	TLS#18 REBAR WITH CAP
19	512604.35	496410.54	1625.29	TLS#19 NAIL
21	512477.16	496080.92	1626.18	TLS#21 REBAR WITH CAP
22	512557.61	495937.68	1631.38	TLS#22 CE MONUMENT B13
23	512641.18	495851.26	1638.98	TLS#23 CE MONUMENT B1
24	512404.07	496201.32	1617.56	TLS#24 NAIL
28	513171.02	496006.67	1624.05	TLS#28 CE MONUMENT
29	513210.11	495889.08	1628.70	TLS#29 CE MONUMENT
30	513897.63	494573.82	1712.56	TLS#30 CE MONUMENT
31	513875.19	494351.86	1727.42	TLS#31 CE MONUMENT
32	513793.16	494061.08	1746.95	TLS#32 REBAR WITH CAP
33	513653.63	493863.75	1752.77	TLS#33 REBAR WITH CAP
113	513170.63	496513.11	1601.53	TBM#213 HUB & TACK
202	513602.75	493671.72	1767.71	TBM#202 HUB & TACK
203	513774.21	494170.85	1732.01	TBM#203 BENCHTIE IN TREE
204	513886.72	494674.25	1703.09	TBM#204 BENCHTIE IN TREE
207	512576.35	495888.80	1632.98	TLS#207 BENCHTIE IN TREE
208	512528.30	496104.16	1621.03	TLS#208 BENCHTIE IN TREE
211	512826.03	496640.17	1603.92	TBM#211 BENCHTIE IN TREE
212	513026.72	496429.70	1608.48	TBM#212 CE MON A30

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WETLANDS AND SITE GRADING

AS-BUILT SURVEY OF
MARTINS CREEK II
MITIGATION PROJECT

CHEROKEE COUNTY — MURPHY — NORTH CAROLINA

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